sirona
The Dental Company

ORTHOPHOS 3 / 3 Ceph / 3 DS

Service Manual

IMPORTANT:

- **Please note that this document applies from serial number 8000 and for modification to ORTHOPHOS 3 DS.**
- **For units with serial number below 8000 please use the Service Manual, order number 18 73 467.**
- **In case of faults which you are unable to eliminate with the help of this manual, please contact our Customer Service.**
- **It is essential that you take this Service Manual with you for every visit to a customer.**

Furthermore, you must always have the spare parts list and the wiring diagrams with you as well.

You can order additional copies of this Service Manual under the

- order number **58 35 744** from our department **GZP** in Bensheim.

See reverse side of manual for address.

Version 6.0
D 3285.077.02.06.02 07.2004

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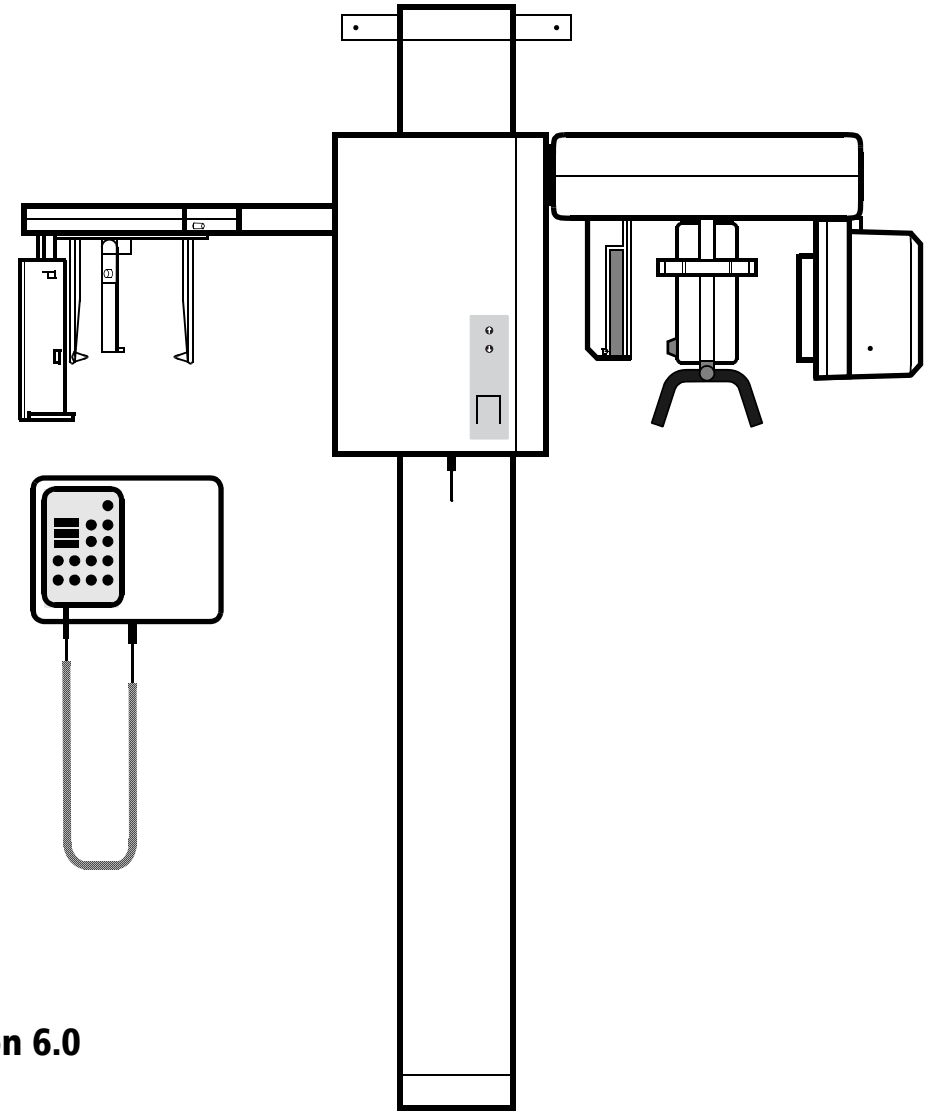
ORTHOPHOS 3 / 3 Ceph / 3 DS

Service Manual

valid from serial no. **8000**
and for modification to **ORTHOPHOS 3 DS**



Version 6.0

The following are also required:

- **Spare parts list**
  Order no. 33 33 908

- **Circuit diagrams**
  ORTHOPHOS 3 / 3 Ceph / 3 DS
  Order no.59 01 629

- **Tools**
  - – Hexagonal-head screwdrivers, angled, sizes 1, 5, 2 – 10
  - – Allen key, size 4, length 200 mm, for socket head screws
  - – Set of hexagonal wrenches, sizes 4 – 14 with 1/4” ratschet, extension and 4 socket head (Allen) inserts 3 – 6 mm
  - – Spirit level
  - – Open-end wrenches, sizes 5.5, 7, 8, 10, 13, 30, and 19, 22 for Ceph
  - – Torx screwdrivers, sizes 10, 20, 25
  - – Phillips-head srewdriver, size 1
  - – Insulated slot-head screwdrivers, sizes 0, 1, 2, 3, 4, 6
  - – Pliers for retaining ring

- **Auxiliary equipment**
  - – Digital multimeter, accuracy class 1
  - – Soldering iron for cable repairs
  - – Diagonal cutter
  - – Cable ties
  - – Teflon insulating tape

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1 Important Notes

Important Notes

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1.1 Important Notes

- The ORTHOPHOS® 3 / 3 Ceph / 3 DS
  operates with the following nominal line voltages: 208V, 230-240V, 50/60 Hz.
  The permissible line voltage fluctuations are 230-240V + 6%, –10%, and 208 V ± 10%.
  The internal line resistance must not exceed 0.8Ω.

- Remote control

  The unit can be equipped with a remote control inside the treatment room or outside an X-ray room.

  For the tests the Multitimer can/must be removed from the remote control module and is to be connected directly to the unit (for remote control with the Multitimer without coiled cable, the coiled cable has to be connected for the tests according to the installation instructions).

  Remember that the fault can then be in the deactivated cable.

- Warm-up time, self-adjustment, cool-down time, turn-off time

  After power-up the unit always requires a warm-up time of one minute.
  During this time, the self-adjustment routine for the mechanical elements and electronics of the unit is executed. Pressing a key during the self-adjustment causes an error indication at the Multitimer. The cool-down time between two consecutive exposures is ensured by the automatic exposure blockage determined by the pulse/pause ratio. The count down of the waiting time required is indicated on the Multitimer. The turn-off time of board XAB-OP must be at least 60s; otherwise the unit will not function correctly (no exposure readiness).

- For demonstration units set the test switch S1/S88 on board DX31 to position 2. LED V2 on board DX31 must light up. *Now, no X-ray radiation is generated.*
  In the interest of improved safety we recommend removing fuse F5 on board DX3.

- The overall software version of the unit is determined by the software versions of the EPROMs on board DX1 and of the Multitimer D4 as well as the version number of the memory card. Refer to the list of software versions. When switching the unit ON the versions are indicated on the Multitimer for about three seconds after the segment test.

- Interference of radio telephones with electromedical equipment

  The use of mobile telephones in the area of the medical practice or clinic is prohibited in order to ensure the operational reliability and safety of electromedical equipment.

- Disposal

  The X-ray tube assembly contains a tube which can implode, a small amount of beryllium, a lead lining and mineral oil.

- Error messages

  Error messages are indicated on the Multitimer.

- Help messages H if radiographic readiness is not reached

  Help messages are displayed on the Multitimer.

1.1 Important Notes

- If you have to remove panels from the unit.

  Refer to section "Removing panels".

  With the panels removed, remember that the direct incidence of sunshine or bright room light can cause unit malfunctions by activating the light barriers.

  Therefore: Avoid direct sunshine and bright lighting above the unit!

  Remember when reattaching the panels:

  Secure sheet metal covers with screws.
  IMPORTANT: For reasons of EMC it is essential to insert all screws.

  Reinstall all panels.

- Measurements

  Before connecting a measuring instrument, always switch the unit OFF.

  Select the required current/voltage type and set the measuring range according to the expected value.

  Carry out continuity tests only with the unit switched off.

  If the release of several exposures with radiation is required for checking the measuring results, you must observe the specified cool-down intervals. This is ensured by the automatic exposure blockage (see Operating Instructions).

  The pulse/interval ratio is 1:10, which means a 10 second pause has to follow after 1 second of radiation. This pulse/interval ratio is automatically guaranteed by the automatic exposure blockage.

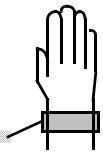
  However, preferable for the X-ray tube is a pulse/pause ratio of 1:20.

  Adhere to the radiation protection guidelines before generating radiation.

Test runs initiated by pressing the T key on the Multitimer followed by actuation of the exposure release button are executed without radiation, i.e. the kV/mA displays remain blank. I

- Replacing parts

  Always turn the unit OFF before replacing any parts.
  When parts located close to the line transformer are to be replaced, switch off the power at the distributor box for the on-site electrical system for safety reasons.
  WARNING! The discharge time for the capacitors is 4 minutes.



To protect electrostatic sensitive devices (ESD) on boards, always wear the wrist band.

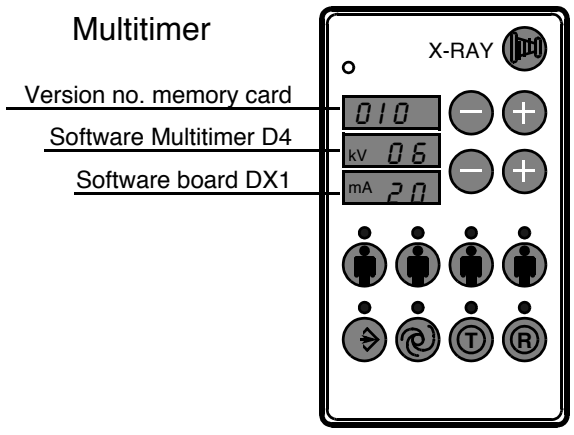
The unit must be checked and newly adjusted following the replacement of the DX1 electronics, the X-ray tube assembly or a diaphragm.

The article numbers for ordering spare parts can be found in the spare parts list, order no. 33 33 908.
The figures in the spare parts list offer valuable assistance when replacing parts.

1.2 List of software versions

From serial no. 8000
for ORTHOPHOS 3 / 3 Ceph / 3 DS
From serial no. 6000
for systems modified to ORTHOPHOS 3 DS

IMPORTANT: No other combinations of software are allowed since these could result in undefined faults.



ORTHOPHOS 3 / 3 Ceph

Unit identification 30

Overall software	DX1 J115	D4 EEPROM J4	Memory Card	Remarks
Version 7.30 04.99	020	006	010	
Version 8.30 03.01	020	006	011	kv/mA levels for Asia and USA; Anomaly level -1 for P1 and P11 for Asia
Version 9.30 05.02	021	006	011	

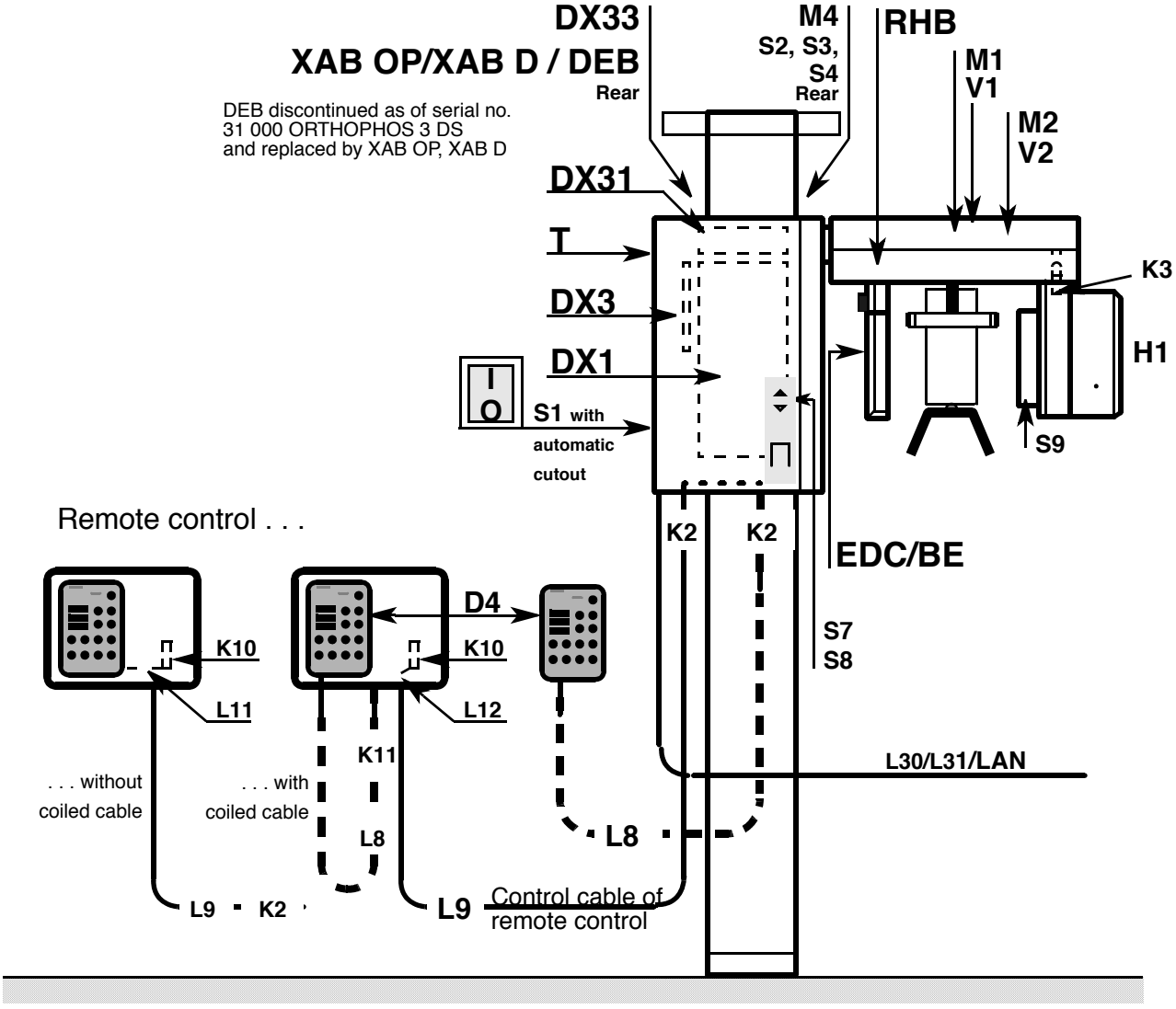
ORTHOPHOS 3 DS

Unit identification 31

Overall software	DX1 EEPROM J115	D4 EEPROM J4	Memory Card	SIDEXIS	Service disk	Remarks
Version 01.31 04.99	020	006	010	≥ 4.2	1.12	
Version 02.31 11.00	020	006	011	≥ 4.2	1.12	XAB OP capable; conventional Ceph possible
Version 03.31 03.01	020	006	012	≥ 4.2	1.12	kv/mA levels for Asia and USA; Anomaly level -1 for P1 and P11 for Asia
Version 04.31 05.02	021	006	012	≥ 4.2	1.12	Correcting error of message E4 04, E3 48

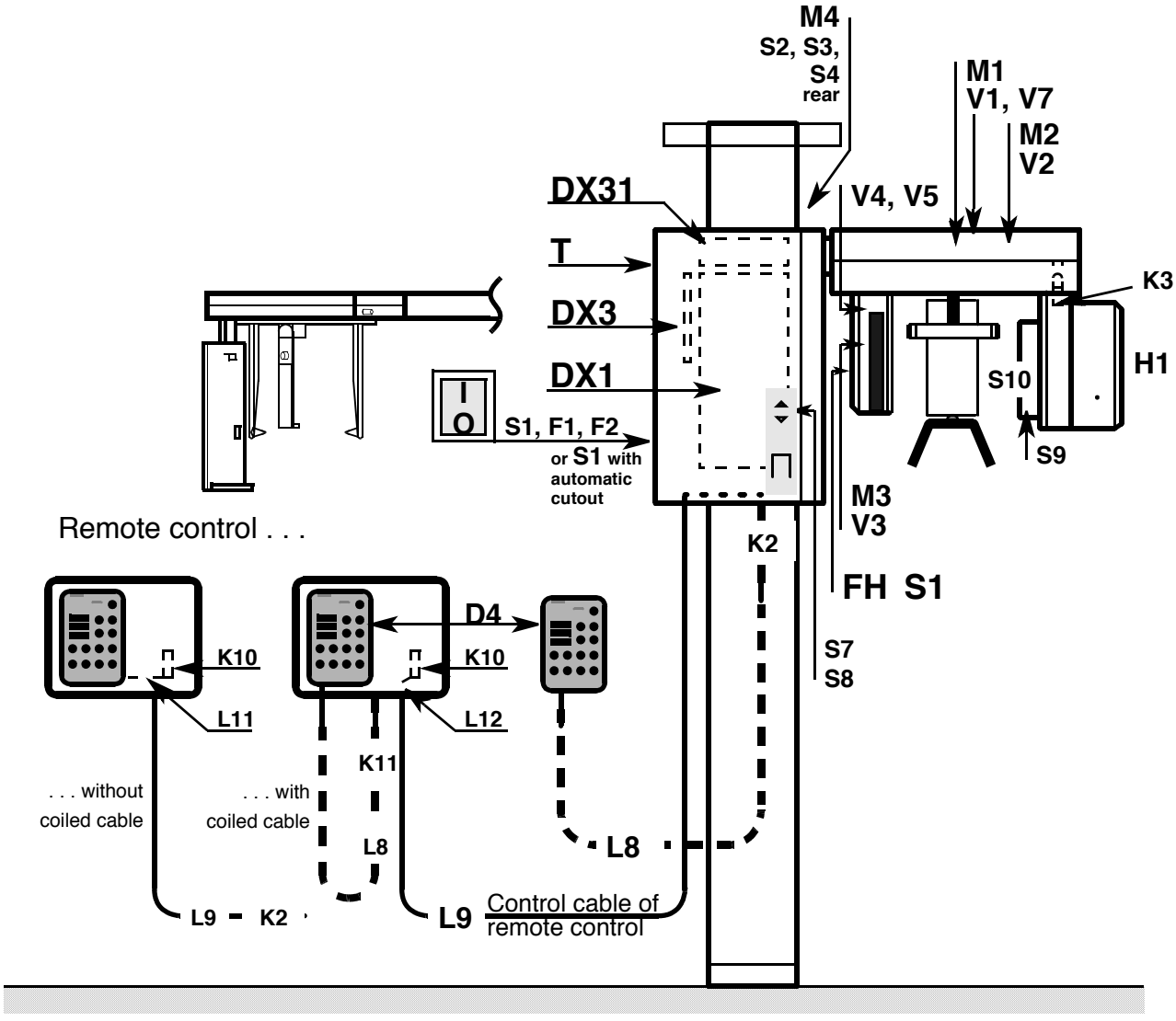
1.3 Major Assemblies and Components

ORTHOPHOS 3 DS



BE	=	Image receptor
DEB, EDC, RHB, D, DX, XAB	=	PC boards
T	=	Transformer
M	=	Memory card
H1	=	X-ray tube assembly
M1	=	Motor for rotation
M2	=	Actuator
M4	=	Motor for height adjustment
K	=	Connector/terminal strips on/in the unit
L	=	Leads/cables
S	=	Switch
X	=	Connectors on boards
V1 - V2	=	Light barriers:
V1	=	Start position for rotation
V2	=	Start position for actuator M2

ORTHOPHOS 3 / 3 Ceph

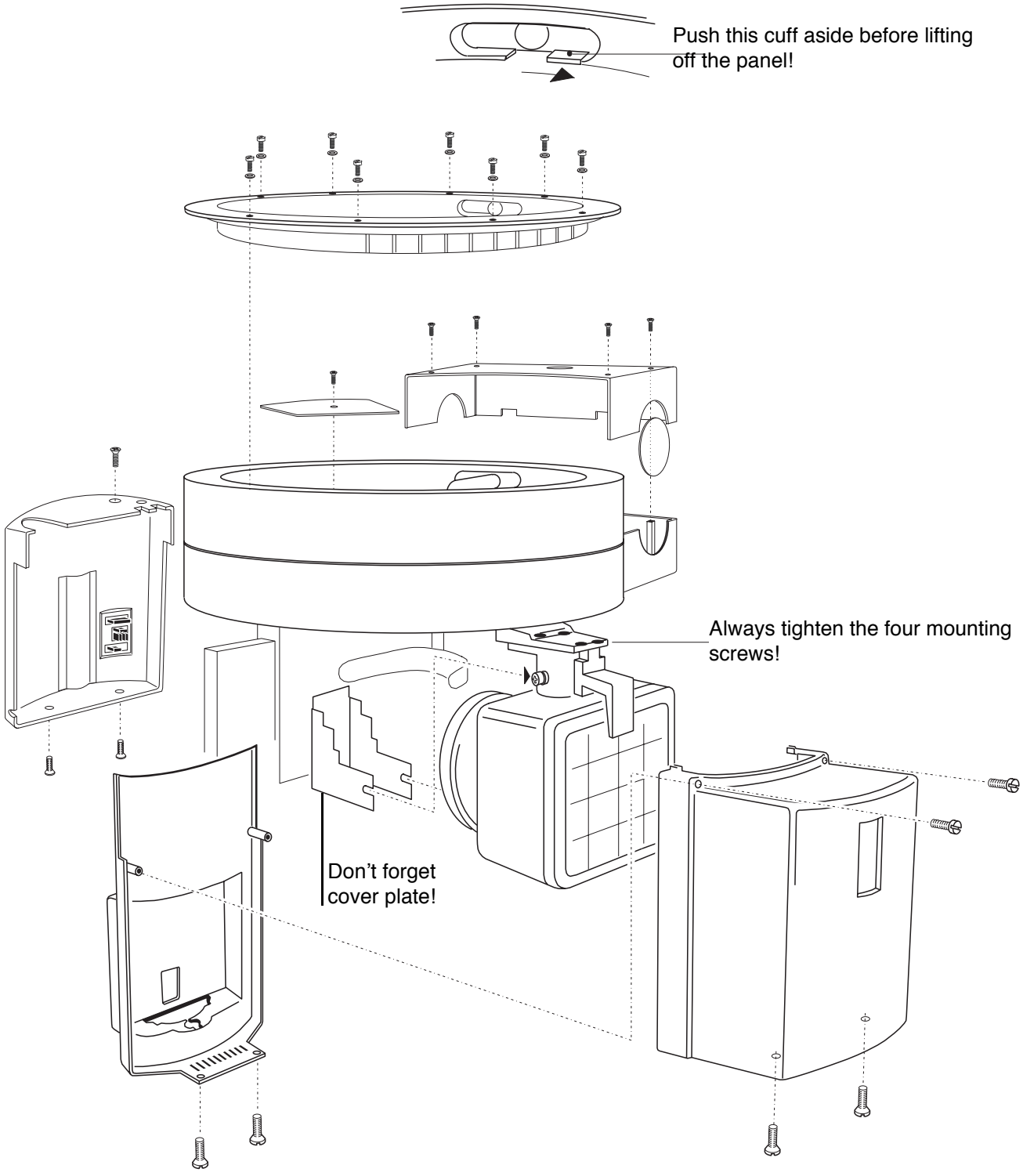


FH	=	Membrane keyboard
D, DX	=	PC boards
T	=	Transformer
M	=	Memory card
H1	=	X-ray tube assembly
F1, F2	=	Main fuses
M1	=	Motor for rotation
M2	=	Actuator
M3	=	Motor for cassette movement
M4	=	Motor for height adjustment
K	=	Connector/terminal strip on/in the unit
L	=	Leads/cables
S	=	Switch
X	=	Connectors on boards

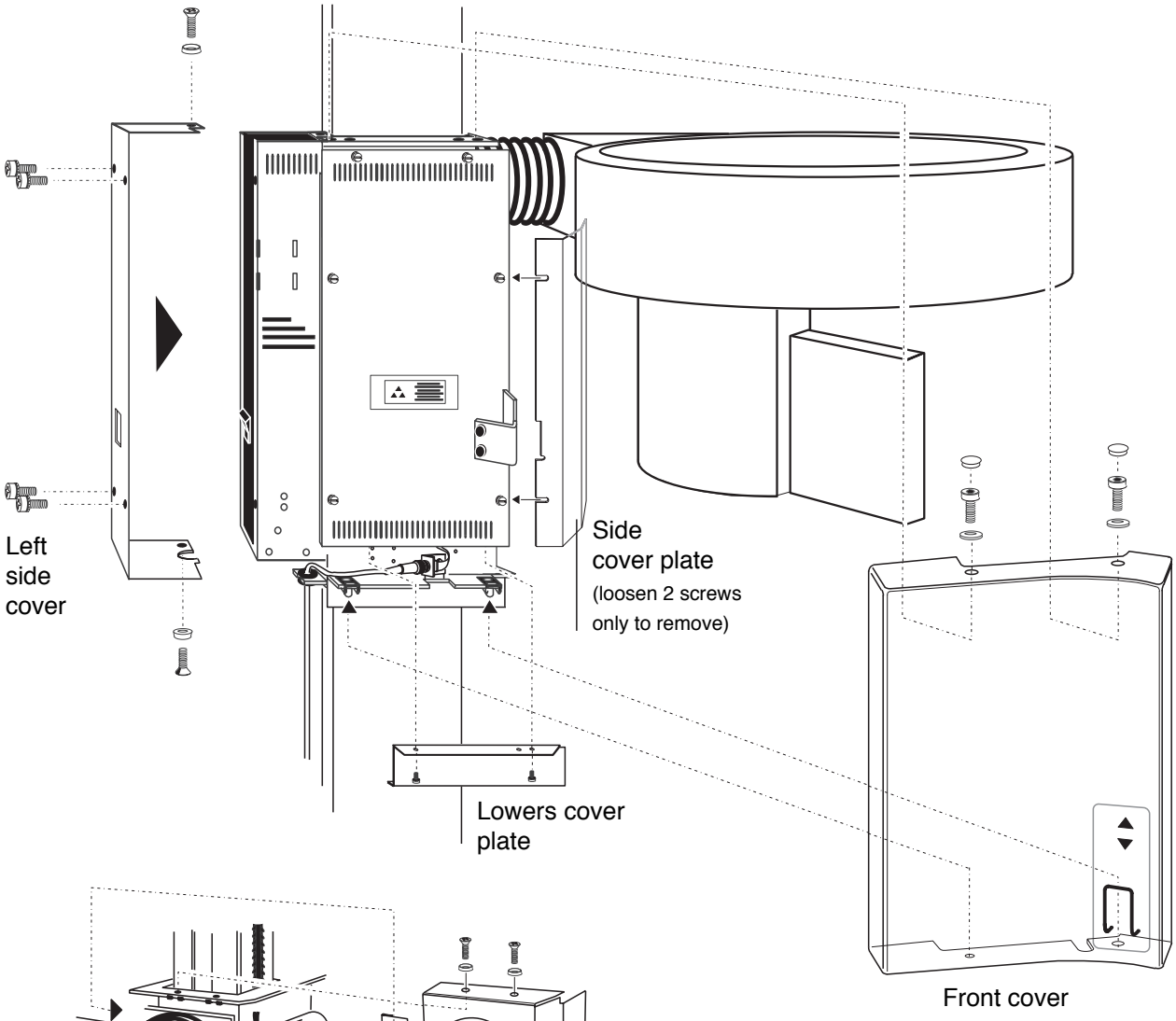
V1 - V7	=	Light barriers:
V1	=	Start position for rotation
V2	=	Start position for actuator M2
V3	=	Start position for film cassette
V4	=	Exposure position cassette holder
V5	=	Cassette holder in Ceph position
V7	=	Rotation ring in Ceph position

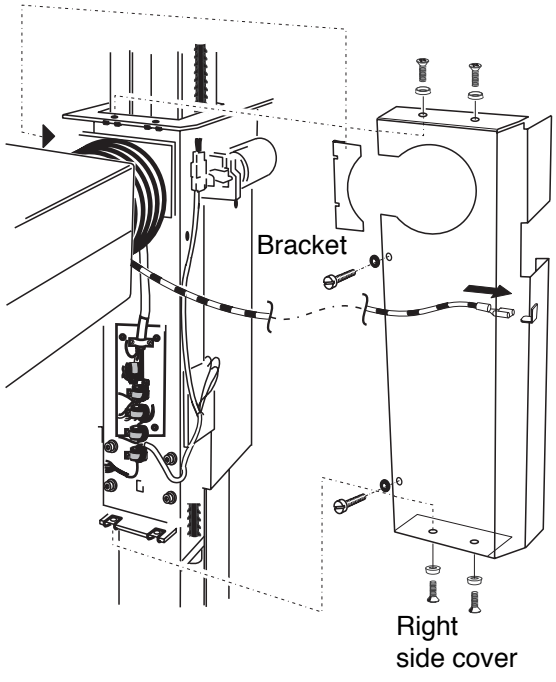
1.4 Removing Panels

X-ray tube assembly, rotation ring



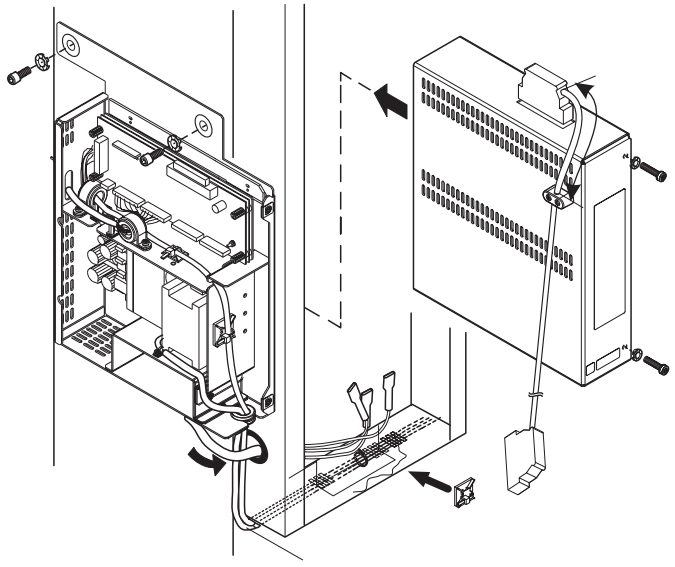
Unit carriage



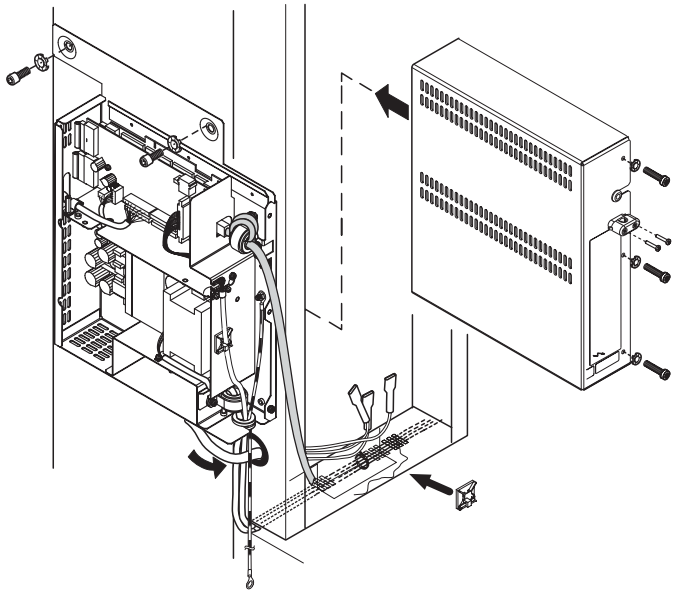


Extension box ORTHOPHOS 3 DS

till Serial-No. 30 999



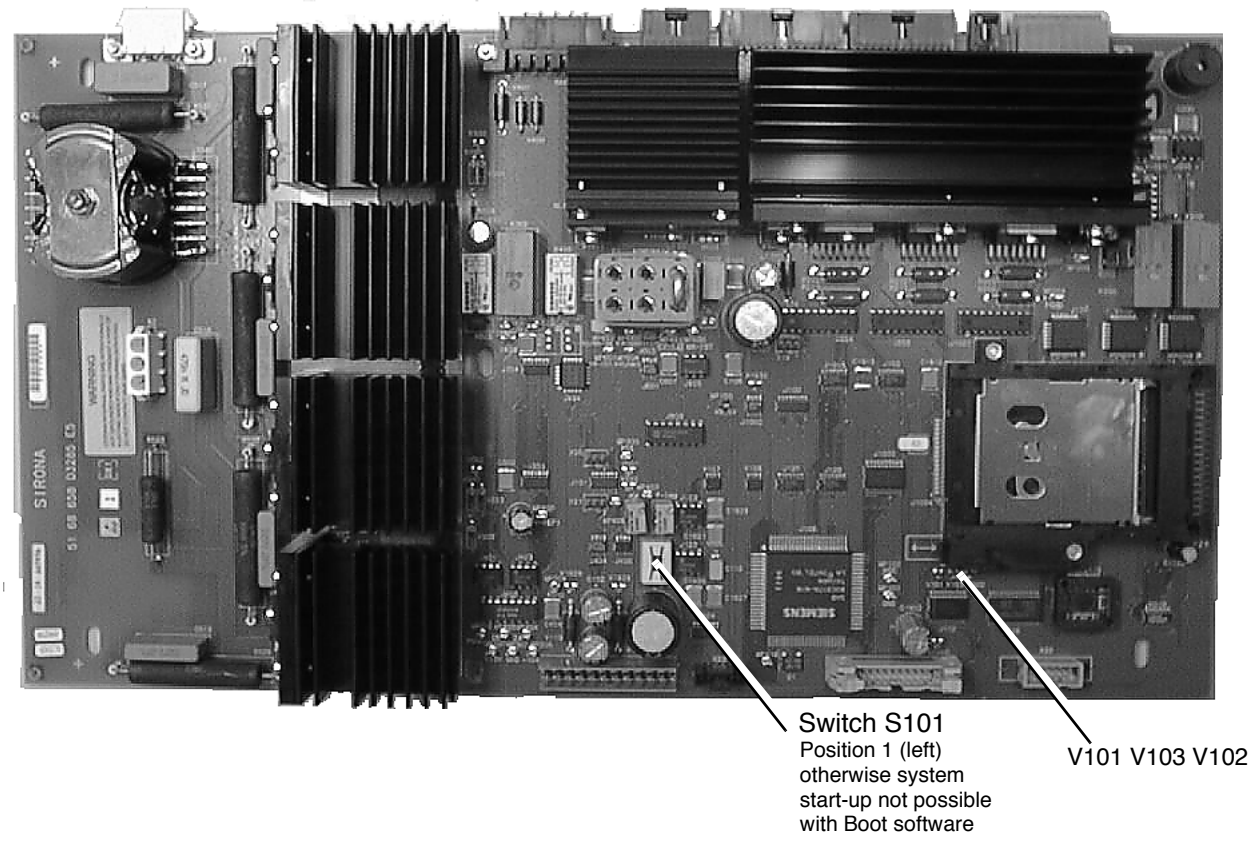
from Serial-No. 31 000



1.5 Photographs of PC Boards

DX1 board

51 68 658

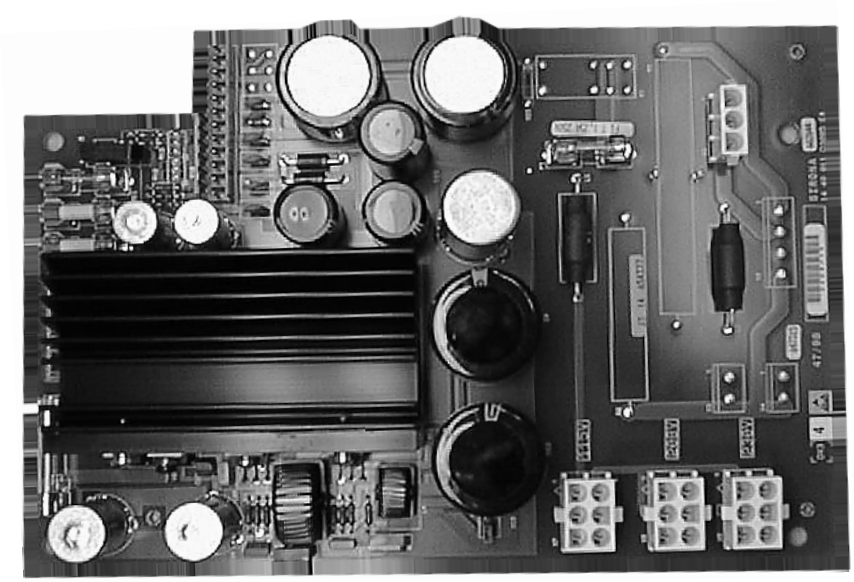


LED1 V101	LED2 V103	LED3 V102	Description	Required action
on	on	on	Controller not o.k.	Replace and adjust DX1
on	off	off	Internal XRAM not o.k.	Replace and adjust DX1
off	on	off	Internal RAM not o.k.	Replace and adjust DX1
off	off	on	Program memory for Boot software not o.k.	Replace and adjust DX1
flashing	flashing	off	Input clock of 82c54 not o.k.	Replace and adjust DX1
flashing	off	flashing	Vref2 voltage not o.k.	Replace and adjust DX1
off	off	flashing	Malfunction of Watchdog timer	Replace and adjust DX1
off	on	on	Unable to switch to memory card	Replace and adjust DX1
flashing	off	off	Program memory of memory card not o.k.	Memory card incorrect, not or only partially programmed
off	flashing	off	not assigned	
flashing	off	on	not assigned	
off	flashing	on	not assigned	
off	off	off	All tests run without errors	Everything o.k.
on	on	off	No memory card detected	Insert memory card correctly
on	off	on	Memory card not correct	Insert memory card for ORTHOPHOS

DX3 and DX31 boards

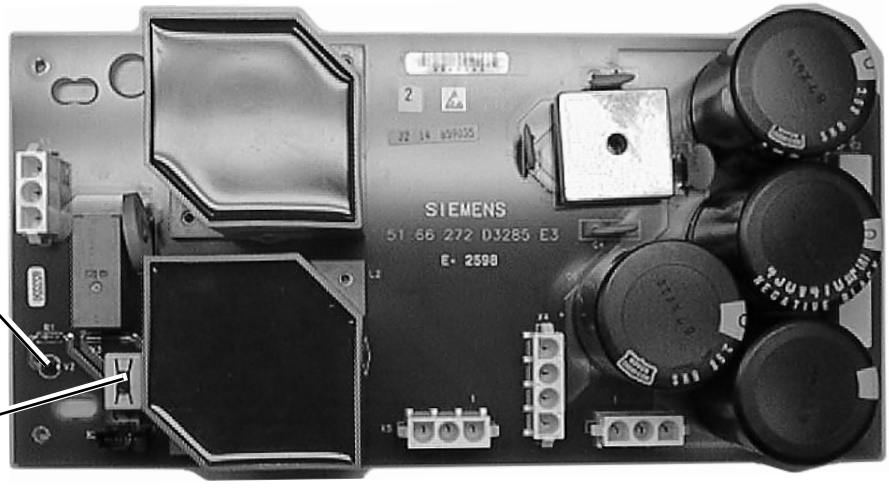
DX3

14 49 011



DX31

51 66 272



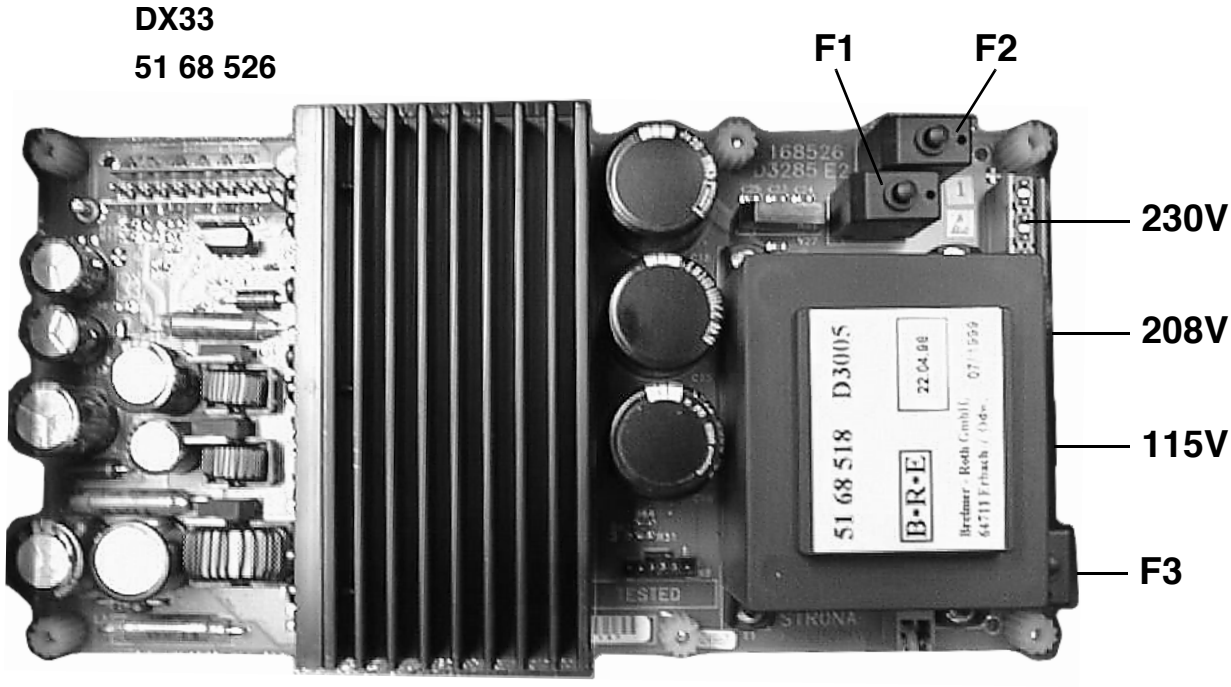
Radiation

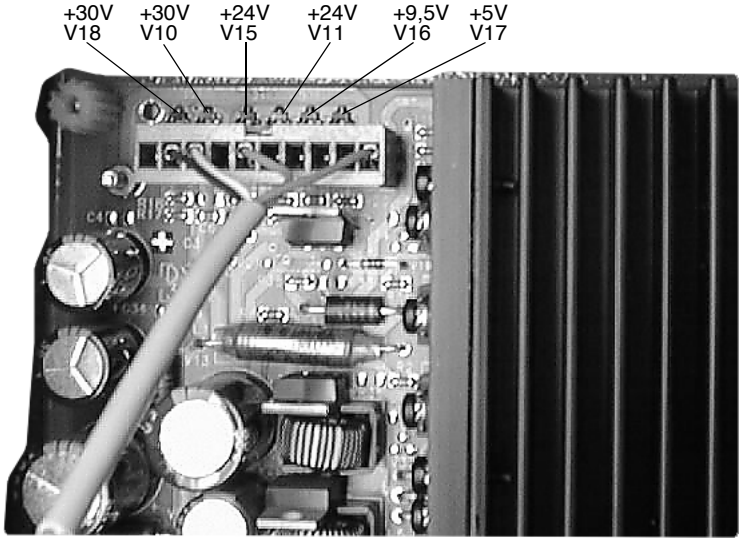
S.88 Demonstration mode

V2

S.88
Position 2
Demonstration mode

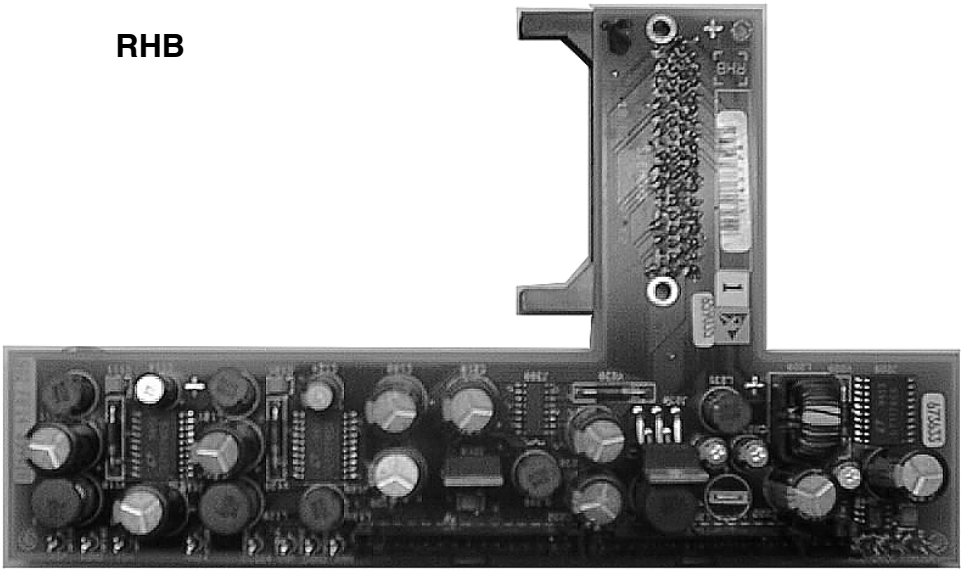
DX33 board

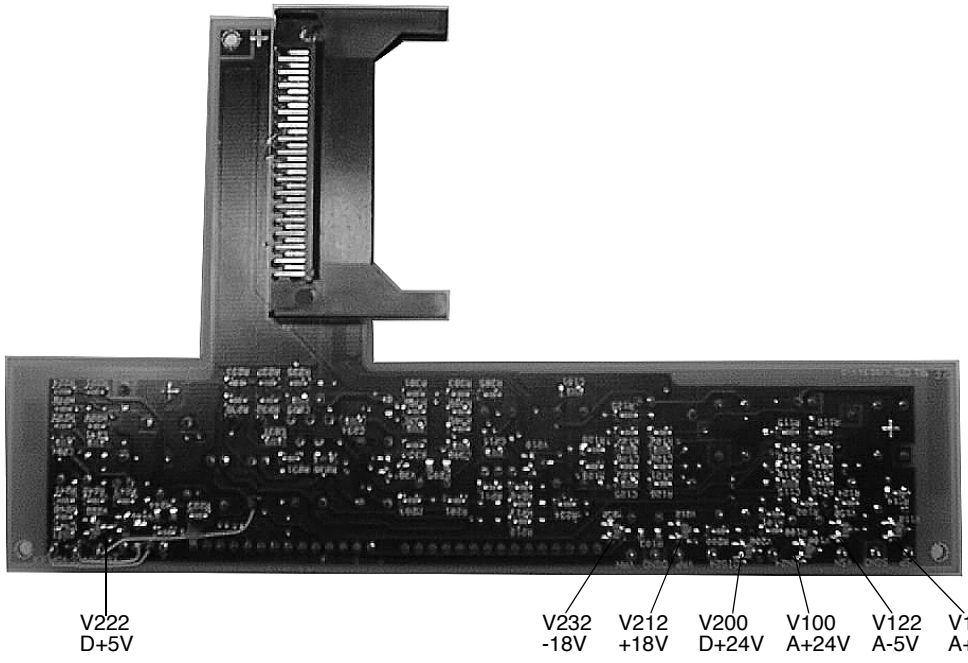

DX33
51 68 526
F1
F2
230V
208V
115V
F3
51 68 518
D3005
B·R·E


+30V V18
+30V V10
+24V V15
+24V V11
+9,5V V16
+5V V17

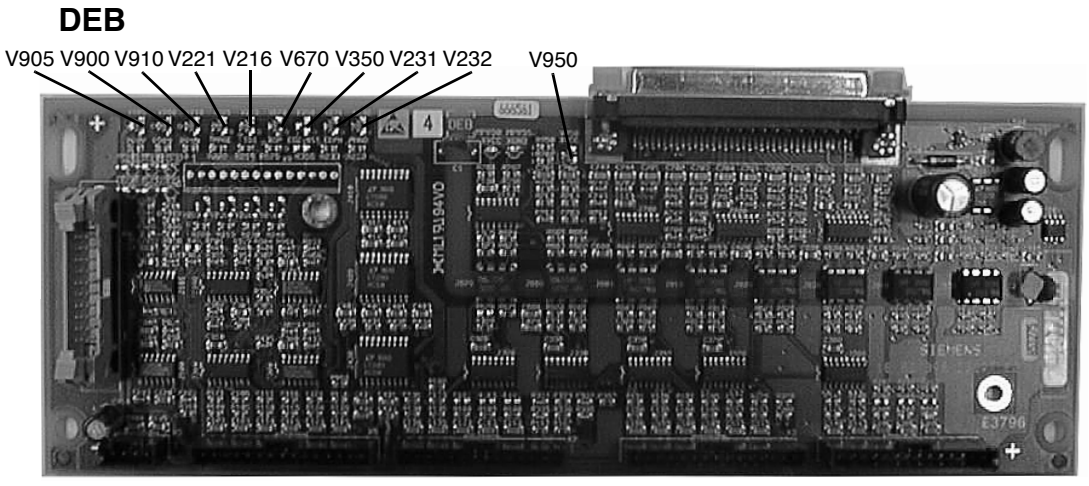
RHB board

RHB





DEB board

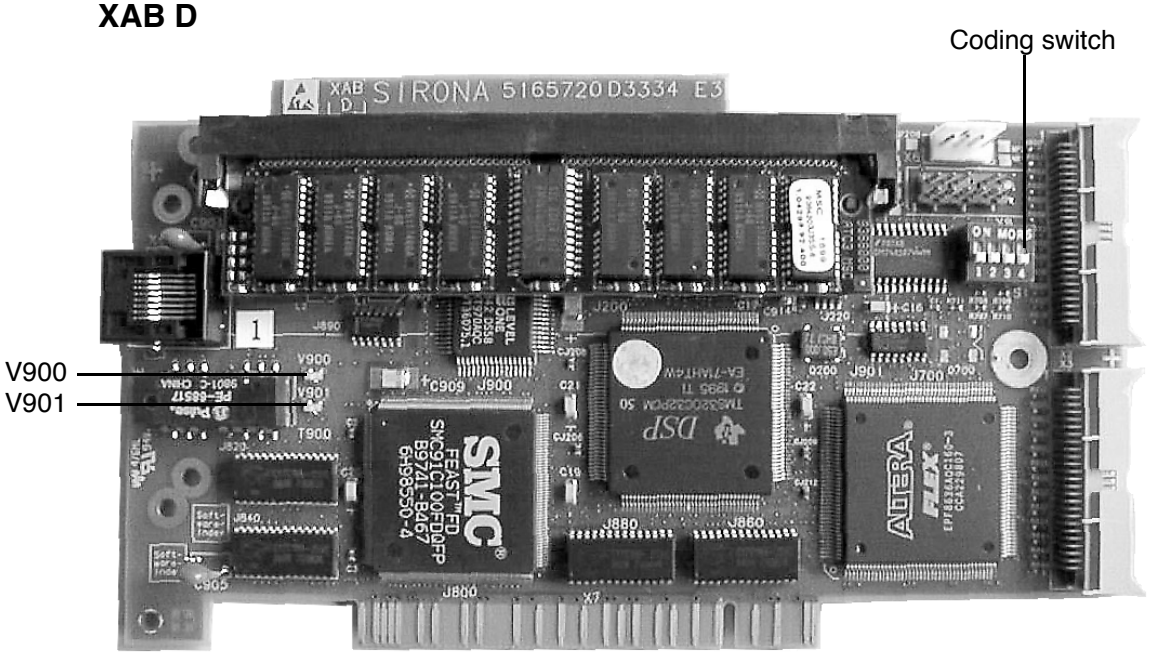


V216	LED, Out clock pulses TDI
V221	LED, radiographic mode
V231	LED, Ceph radiography mode only with ORTHOPHOS Plus DS Ceph
V232	LED, Panoramic radiography mode
V350	LED, EDC Reset (not inserted)
V670	LED, PC exposure readiness ACTIVE signal
V900	LED, digital supply voltage RHB +24V
V905	LED, analog supply voltage RHB +24V
V910	LED, supply voltage DEB +5V ORTHOPHOS
V950	LED, supply voltage DEB +5V PC

V905	V900	V910	V221	V216	V670	V350	V231	V232	V950	Status
		X						X	X	**Standby Pan**
		X					X		X	Standby Ceph **without function**
X	X	X						X	X	**Panoramic radiography mode**
X	X	X					X		X	Ceph radiography mode **without function**
X	X	X	X		X			X	X	**Panoramic radiography mode Image generation test image**
X	X	X	X		X		X		X	Ceph radiography mode Image generation test image **without function**
X	X	X	X	glows	X			X	X	**Panoramic radiography mode X-ray**
X	X	X	X	glows	X		X		X	Ceph radiography mode X-ray **without function**

XAB OP and XAB D boards

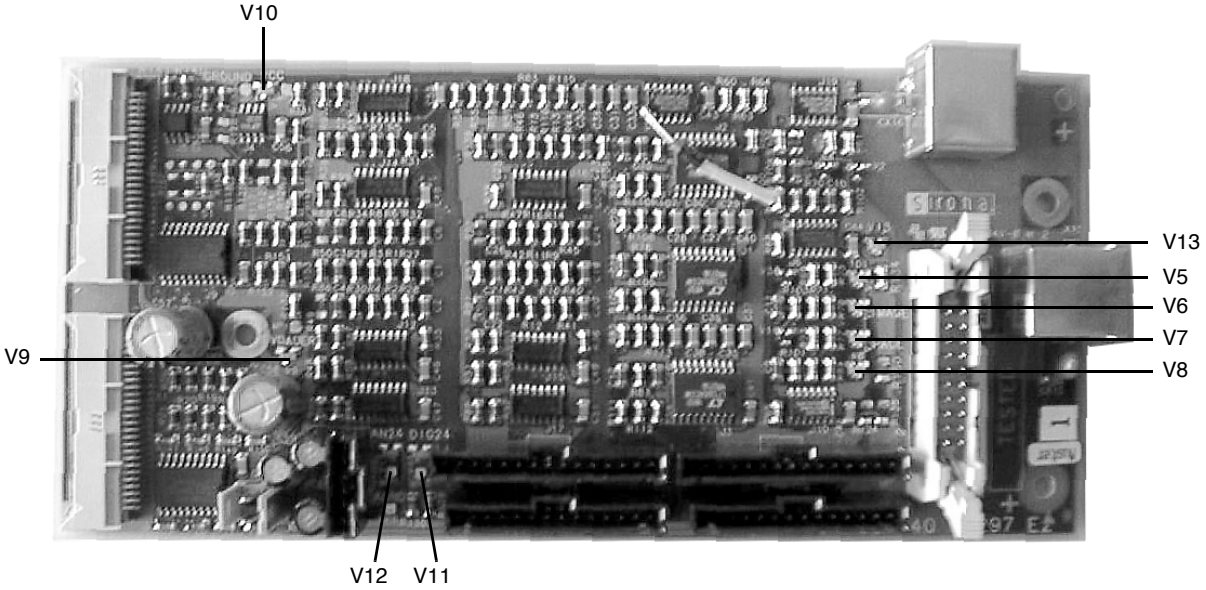
XAB D



V900 = RD Transmit, GN Receive

V901 = RD Link (adress recognition), GN 100 Mbps (Megabits per sec)

XAB OP



V5	LED, TDI distance pulses
V6	LED, IMAGE radiographic mode
V7	LED, radiographic mode Ceph only with ORTHOPHOS Plus DS Ceph
V8	LED, radiographic mode Pan
V9	LED, V continuous
V10	LED, VCC +5V
V11	LED, Digital supply voltage +24V
V12	LED, Analog supply voltage +24V
V13	LED, PC exposure readinesst ACTIVE signal

2 List of Messages

List of Messages

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After the cool-down interval has elapsed you want to release an exposure, but the Ready LED is flashing:

- Press the **X-ray** key on the Multitimer.
  CAUTION: Take radiation protection measures.
  The **H3 or H4** message then appears on the **kV/mA** display.
- Find in the following list the actions required to return the unit to readiness for exposure.
- Before carrying out the required action clear the help message by pressing the **R** key on the Multitimer.

	Help message	Description	Required action
Panorama or Ceph	H3 01	Rotation unit not in the start position.	Press the Return key **R**.
	H3 04	Cassette holder not in Panorama position.	Swivel cassette holder to stop position. For error correction follow service routine S.16, ☝ see page 5 - 45.
	H3 06☝	Locking button on diaphragm wheel not engaged (Panorama diaphragm).	Correctly engage locking button on diaphragm wheel, ☝ see page 3 - 15.
	H3 11	Cassette holder not in Ceph position.	Swivel cassette holder to stop position. For error correction follow service routine S.16, ☝ see page 5 - 45.
	H3 12	Rotation unit not in start position for Cephalometry.	Press **R** key.
	H3 20	Radiographic data not acknowledged.	Acknowledge radiographic data with Return key **R**.
SIDEXIS	H4 01	Image receptor not inserted correct.	Insert image receptor up to end stop. For error correction follow service routine S.32, ☝ see page 5 - 57.
	H4 03	SIDEXIS not ready for exposure.	Make SIDEXIS ready for exposure. See SIDEXIS Service Manual.
	H4 10	Image receptor not suitable for exposure set.	Replace the image receptor in the plug-in location according to the programmed acquisition.
	H4 20	Image could not be transferred to SIDEXIS.	Transfer exposure by SiRescue service program to the PC, see SIDEXIS User Manual. **CAUTION** Do not switch off the unit until the help message goes out.

The above mentioned actions will eliminate help messages caused by operating errors.
If the help message cannot be eliminated by the above actions, the fault is of another nature. Proceed with troubleshooting as described on the following pages.

2.2 List of Error Messages

	Error message	Description	Required action
Multitimer	**E1 01** ☝	A key on the Multitimer was pressed during self-adjustment or is defective.	Proceed according to section "Correcting error E1 01", ☝ see page 3 - 19.
	E1 02 ☝ **E2 03** ☝	Signal paths to control board D1 are interrupted.	Proceed according to section "Correcting error E1 02, ☝ see page 3 - 19.
	E1 03	Faulty communication with the unit.	Acknowledge the fault by pressing the **R** key on the Multitimer.
X-ray tube assembly E2 . . .	**E2 01** ☝	Appears upon pressing the exposure button. Overheated X-ray tube assembly, pulse/pause ratio not observed.	Acknowledge the fault by pressing the **R** key on the Multitimer. Allow the X-ray tube assembly to cool down. If the error message reoccurs, proceed according to section "Correcting error E2 01", ☝ see page 3 - 21.
	E2 03 ☝	See E1 02	☝ see page 3 - 19
	E2 04 ☝	Zero power range has been re-initialized.	Acknowledge the fault by pressing the **R** key on the Multitimer. Unfortunately, the freely programmed values will be lost and must be reprogrammed. If not possible: correct the error with E2 04, ☝ see page 3 - 23.
	E2 10	Max. radiation time of the program exceeded.	Only possible in service mode; acknowledge the fault by pressing the **R** key on the Multitimer. Does this error occur often? Board DX1 defective → replace and perform "Adjusing board DX1", ☝ see page 4 - 31.
	E2 11 ☝	$kV_{max.}$ (tube voltage) exceeded.	Proceed according to section "Correcting error E2 11", ☝ see page 3 - 25.
	E2 12 ☝	$mA_{max.}$ (tube current) exceeded.	Proceed according to section "Correcting error E2 12", ☝ see page 3 - 27.
	E2 13 ☝	$VH_{max.}$ (filament voltage) exceeded.	Proceed according to section "Correcting error E2 13", ☝ see page 3 - 29.
	E2 14 ☝	Short-circuit of an output stage on DX1 deactivated.	Proceed according to section "Correcting error E2 14", ☝ see page 3 - 31.
	E2 15	$VH_{max.}$ continuously present.	Hardware error, board DX1 defective → replace and perform "Adjusing board DX1", ☝ see page 4 - 31.
	E2 16 ☝	kV_{actual} cable is interrupted.	Proceed according to section "Correcting error E2 16", ☝ see page 3 - 33.
	E2 18	Non-localizable fault in obtaining the DC/AC signals.	Acknowledge the fault by pressing the **R** key on the Multitimer. If fault reoccurs, DX1 board is defective → replace. Perform "Adjusting board DX1", ☝ see page 4 - 31.
	E2 20 ☝	Occurs upon pressing the exposure button e.g. with the X-ray room door contact open - exposure release lead in the Multitimer cable is broken.	Close X-ray room door. Acknowledge the fault by pressing the **R** key on the Multitimer. If the fault reoccurs, proceed according to section "Correcting error E2 20", ☝ see page 3 - 35.
	E2 35	Invalid data in the data memory.	Erase data in the EEPROM with **'Service Routine 09'**. Then press the **R** key. If the message reoccurs, DX1 board is defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.

	Error message	Description	Required action
X-ray tube assembly E2 . . .	E2 40☝	VH setpoint out of tolerance ± 10 %.	Proceed according to section "Correcting error E2 40", ☝ see page 3 - 39.
	E2 41	kV setpoint out of tolerance ± 5 %.	Adjust board DX1. If not possible, DX1 board is defective → replace and adjust, ☝ see page 4 - 31.
	E2 42	mA setpoint out of tolerance ± 5 %.	Adjust board DX1. If not possible, DX1 board is defective → replace and adjust, ☝ see page 4 - 31.
	E2 43☝	VH actual value out of tolerance ± 10 %.	Proceed according to section ”Correcting error E2 43", ☝ see page 3 - 41.
	E2 44☝	kV actual value out of tolerance ± 10 %.	Proceed according to section ”Correcting error E2 44", ☝ see page 3 - 43.
	E2 45☝	mA actual value out of tolerance ± 10 %.	Proceed according to section ”Correcting error E2 45", ☝ see page 3 - 45.
	E2 46	Error while increasing or decreasing the kV value.	Software error or DX1 board defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.
	E2 47	Incorrect setpoint value after automatic setpoint adjustment.	Adjust board DX1. If not possible, DX1 board is defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31. EEPROM defective.
	E2 48	Faulty user offset while increasing the kV value.	Acknowledge the fault by pressing the **R** key. Caution: If the offset was changed by the user (possible in the range from -6 to +3) it will be reset to zero. If the fault reoccurs, the DX1 board is defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.
Unit E3 . . .	E3 01☝ E3 02☝	Operating element for light barrier V3 of actuator M2 has not left/reached the tripping position.	Proceed according to section "Correcting error E3 01/02", ☝ see page 3 - 47.
	E3 05☝ E3 06☝	Cassette carriage has not left/reached the reference point.	Proceed according to section "Correcting error E3 05 /06", ☝ see page 3 - 49.
	E3 08	Fault in film motor counter.	Acknowledge the fault by pressing the **R** key. If the fault reoccurs, the DX1 board is defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.
	E3 12☝	Key for height adjustment ↑↓ was pressed during self adjustment or is defective.	Proceed according to section "Correcting error E3 12", ☝ see page 3 - 51.
	E3 23	Return key **R** was pressed during the switch-on procedure or before completion of unit self-adjustment.	Acknowledge the fault by pressing the **R** key on the Multitimer.
	E3 24	""X-Ray Control” is indicated at switch-on.	a) If error message occurs in combination with E1 02: button was recognized on Multitimer as actuated - check buttons or replace Multitimer. b) If error message occurs alone, pull out Multitimer and switch on again. If error message occurs again: DX1 defective → replace and perform “Adjusting board DX1”, ☝ see page 4 - 31. If error message no longer occurs: replace Multitimer.

	Error message	Description	Required action
Unit E3 . . .	**E3 25**	Incorrect data for exposure control.	Memory card or DX1 defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.
	E3 26	Data in EEPROM not compatible with software version of memory card.	Check for compatibility of software versions according to the list, ☝ see page 1 - 5. Install the correct software combination, or the memory card or DX1 is defective.
	E3 32☝ **E3 33**☝	Start position for rotation was not exited/reached.	Proceed according to section "Correcting error E3 32/33", ☝ see page 3 - 53.
	E3 35	Rotation counter not counting correctly.	Software error or DX1 board defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.
	E3 36☝	Cassette holder was swivelled from the Pan position during the Pan exposure.	Proceed according to section "Correcting error E3 36", ☝ see page 3 - 57.
	E3 37	Counter IC of actuators not counting correctly.	DX1 board defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.
	E3 39☝	Light barrier for Ceph position rotation indicates invalid status.	Proceed according to section "Correcting error E3 39", ☝ see page 3 - 61.
	E3 41	Error with counter for kV increase.	DX1 board defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.
	E3 42	Rotation has not reached Ceph position.	Light barriers V7/V8 maladjusted/defective.
	E3 43	Error with counter for radiation times.	DX1 board defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.
	E3 46☝	Position of cassette holder cannot be determined.	Proceed according to section "Correcting error E3 46", ☝ see page 3 - 63.
	E3 47*	Memory card not inserted.	Insert memory card.
	E3 48*	Inserted memory card invalid.	Replace memory card.
	E3 49	Watchdog reset performed.	Acknowledge the fault by pressing the R key. Fault occurs with voltage fluctuations; if recurs frequently: DX31 or DX1 board is defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.
	E3 50	This service exposure is not possible in the demonstration mode.	Deactivate demonstration mode. Turn test switch S1/S88 on DX31 to position 1. V2 on DX31 must not light up. Observe section "Demonstration mode cannot be switched ON/OFF", ☝ see page 3 - 9.
	E3 52	Unit identification does not match the inserted memory card.	When modifying ORTHOPHOS 3 to 3 DS always perform Service-Routine S.17, when replacing DX1 only in case of deviations. ☝ see page 5 - 49.
	E3 53	Switch S101 in right-hand position. System starts up without Boot software.	Turn switch S101 to left-hand position.

*** Is not displayed on all units**

	Error message	Description	Required action
SIDEXIS	**E4 01** ☝	Exposure aborted by SIDEXIS.	Proceed according to section "Correcting error E4 01", ☝ see page 3 - 65.
	E4 06 ☝	Fault at one of the supply voltages.	Proceed according to section "Correcting error E4 06", ☝ see page 3 - 69.
	E4 07	Fault in TDI pulse generation.	DX1 board defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.
	E4 08 ☝	Aborted by SIDEXIS during radiation.	Proceed according to section "Correcting error E4 08", ☝ see page 3 - 73. In service program → make SIDEXIS ready for exposure; factory service 2.
	E4 10	Communication fault with image acquisition card XOP (in PC) or XAB OP (in ORTHOPHOS).	With image acquisition card XOP: check cable L30/L31 and DEB board. With XAB OP: XAB OP does not respond or has crashed. Switch unit off and on again. Or not in correct service mode in SIDEXIS.
	E4 11 ☝	Image receptor not ready for exposure.	Proceed according to section "Correcting error E4 11", ☝ see page 3 - 81. Check signal path from image receptor to PC.
	E4 12	Image receptor not logged in.	Load contents of image receptor floppy.
	E4 16 ☝	Active signal present when switching ON.	Check SIDEXIS readiness for exposure. With XOP board: Check line path from XOP board in PC to DEB/DX1 board. With XAB OP board: Check line path from DX1 board to XAB OP board. Proceed according to section "Correcting error E4 16", ☝ see page 3 - 89.
	E4 17	Software versions of DX1 and XAB OP boards are not compatible.	Establish a valid software combination by replacing the memory card; load a new XAB-OP software version (see SIDEXIS service manual); SIXABCON description.
	E4 18	Image receptor could not be addressed prior to exposure.	Proceed according to section "Correcting error E4 11", ☝ see page 3 - 81.
	E4 19	A software download of XAB OP is performed (no acknowledgement of error message possible).	Wait until the 4 LEDs above the patient symbols start flashing; then switch the unit off. Software download is completed.
	E4 21	The XAB OP is in the initialization phase (Boot Service) (proceed as described in SIDEXIS service manual; SIXABCON description). The XAB OP has no valid IP address.	After a valid IP address has been assigned by SIXABCON the error message can be acknowledged on the unit (R key).
	– **–** **–**	Indication at Multitimer. Communication between control board DX1 and Multitimer / board D4 is faulty.	Check V3 on Multitimer (Ready to operate). Check Multitimer cable. Check line voltage and terminal strip K1. Measure supply voltage at DX1 X1; if OK, DX1 board is defective; if not, DX3 or cable is defective.
	– – – **–** **–** **–**	Indication at Multitimer	At every switch-on ca. 2s, if longer: check LED V101-103. Check memory card. DX1 board is defective → replace and perform "Adjusting board DX1", ☝ see page 4 - 31.

2.3 List of Service Routines

Service routine	Description	When required
S.01	Radiation without rotation	All adjustments of X-ray tube assembly, e.g. acceptance testing, functional test, head adjustment, diaphragm adjustment.
S.02	Radiation without rotation for Ceph	See **S.01**.
S.03	Adjustment of kV setpoint, mA setpoint and VH setpoint	After replacing the DX1 board, or malfunction of the X-ray tube assembly.
S.04	Test of actual values kV, mA, VH.	After replacing DX1 or X-ray tube assembly.
S.05	Heating adjustment	After replacing DX1 or X-ray tube assembly.
S.06	Reading/deleting the radiation counter	After replacing the X-ray tube assembly or in warranty cases
S.07	Deleting the error memory	After replacing the X-ray tube assembly.
S.09	Erasing EEPROM on DX1 (deletes all data)	In case of software problems (all software adjustments are deleted and must be reprogrammed).
S.11	Adjusting the kV increase to customer's request	Too much kV increase in the spine region.
S.13	Hardware service	Problems with DX1 board.
S.14	Rotation functions	Mechanical malfunctions of rotation and test of the light barriers.
S.15	Check of actuator	Mechanical malfunctions, layer correction, light barrier adjustment.
S.16	Check of film holder	Film holder problems.
S.17	Unit identification	Changing the unit identification.
S.18	Height adjustment	Checking freedom of movement.
S.25	Adjusting the film/screen combination or the kVmA step series	Change the Program Values
S.27	Setting country code	Change anomaly
S.32	Image receptor test, Pan	For checking the image receptor.
S.35	PC service	Problems with readiness for exposure.
S.37	XAB OP service	Read out and delete IP addresses
S.88	Demonstration mode	Selected with switch S1 on DX31. Switches the unit to demonstration mode (no radiation).

The following descriptions should always be seen in relation to the ORTHOPHOS 3 DS unit.
With error message E4 01, ORTHOPHOS 3 DS is generally functional and the SIDEXIS messages must be observed. With other error messages on ORTHOPHOS 3 DS, the SIDEXIS messages indicate secondary faults.

OP : ORTHOPHOS 3 DS

XOP : Image acquisition card for Panorama radiography

EDC : Image receptor electronics on ORTHOPHOS 3 DS

Error message up to SIDEXIS 5.2x	Error message from SIDEXIS 5.3	Description	Required action
Multitimer Break 1	**Multitimer Break 0xA001**	Interruption caused by releasing the X-ray button on the Multitimer during radiation.	
Multitimer Break 2	**Multitimer Break 0xA002**	Interruption caused by releasing the X-ray button on the Multitimer between two partial exposures.	
OP Break 1	**OP Break 0xB001**	Interruption by OP.	Check error message on Multitimer.
OP Break 2	**OP Break 0xB002**	Interruption by OP.	Check error message on Multitimer.
EDC Break XXX	**EDC Break 0xCxxx**	Voltage problem/failure at image receptor, see Appendix A.	The displayed number XXX is an indication of several error numbers, see Appendix A.
XOP Break 1/2/3 **	**XAB OP Break 0xD001/002/ 003 ****	Timeout on the XOP/XAB, no defined functional call from OP within a preset time. (only for ORTHOPHOS Plus DS Ceph)	Check for mechanical obstruction of the OP movement. Check the software version of OP and SIDEXIS for compatibility.
XOP Break 10 **	**XAB OP Break 0xD010 ****	Incorrect communication between XOP/ XAB and image receptor.	Remove the image receptor from its holder and reinsert it firmly. Check signal path with XOP: XOP – cable connection – OP – image receptor. Check signal path with XAB: XAB – image receptor. Check the voltages at the image receptor.
XOP Break 30	**XAB OP Break 0xD030**	OP pulses are more than intended for the exposure.	Check the software versions of OP and SIDEXIS for compatibility. Check whether OP is "hung up".
XOP Break 40	**XAB OP Break 0xD040**	Image acquisition card holds insufficient storage space for the intended exposure.	Check the software versions of OP and SIDEXIS for compatibility. Check the memory configuration of XOP/ XAB.
XOP Break 50 **	**XAB OP Break 0xD050 ****	Image acquisition card receives no image information.	Remove EDC from its holder and reinsert it firmly. Check the signal path: Check signal path with XOP: XOP – cable connection – OP – image receptor. Check signal path with XAB: XAB – image receptor. Check the voltages at the image receptor.
XOP Break 60/70	**XAB OP Break 0xD060/070**	ORTHOPHOS emits incorrect exposure ID.	Check the software versions of OP and SIDEXIS for compatibility. Check the error message displayed by the OP. (data or address bus error?)

**** see Correcting error of message E4 08 and E4 01.**

The error message indicates a combination of several fault causes:
e.g. display on SIDEXIS 3 ¦ C

HEX			3		C			
Valence	8 2^3	4 2^2	2 2^1	1 2^0	8 2^3	4 2^2	2 2^1	1 2^0
Bit	7	6	5	4	3	2	1	0
Error			EDC RESET	EDC VSP	EDC VSN	EDC VDD	EDC VAN	EDC VAP
	0	0	1	1	1	1	0	0

These voltages are not present

Bit = 0 Ok, fault has not occurred
Bit = 1 Error, fault has occurred, signal is missing

Bit number	Error	LED RHB		Meaning
0	EDC VAP ERROR	V212	0x01	Voltage VAP +18 V not present/too low
1	EDC VAN ERROR	V232	0x02	Voltage VAN – 18 V not present/too low
2	EDC VDD ERROR	-------	0x04	Voltage VDD not present/too low
3	EDC VSN ERROR	V122	0x08	Voltage VSN – 5 V not present/too low
4	EDC VSP ERROR	V112	0x10	Voltage VSP +5 V not present/too low
5	EDC RESET ERROR	V222	0x20	Voltage VCC +5 V not present/too low or digital section is in reset state
6			0x40	Internal message
7			0x80	Internal message

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3 Troubleshooting

Troubleshooting

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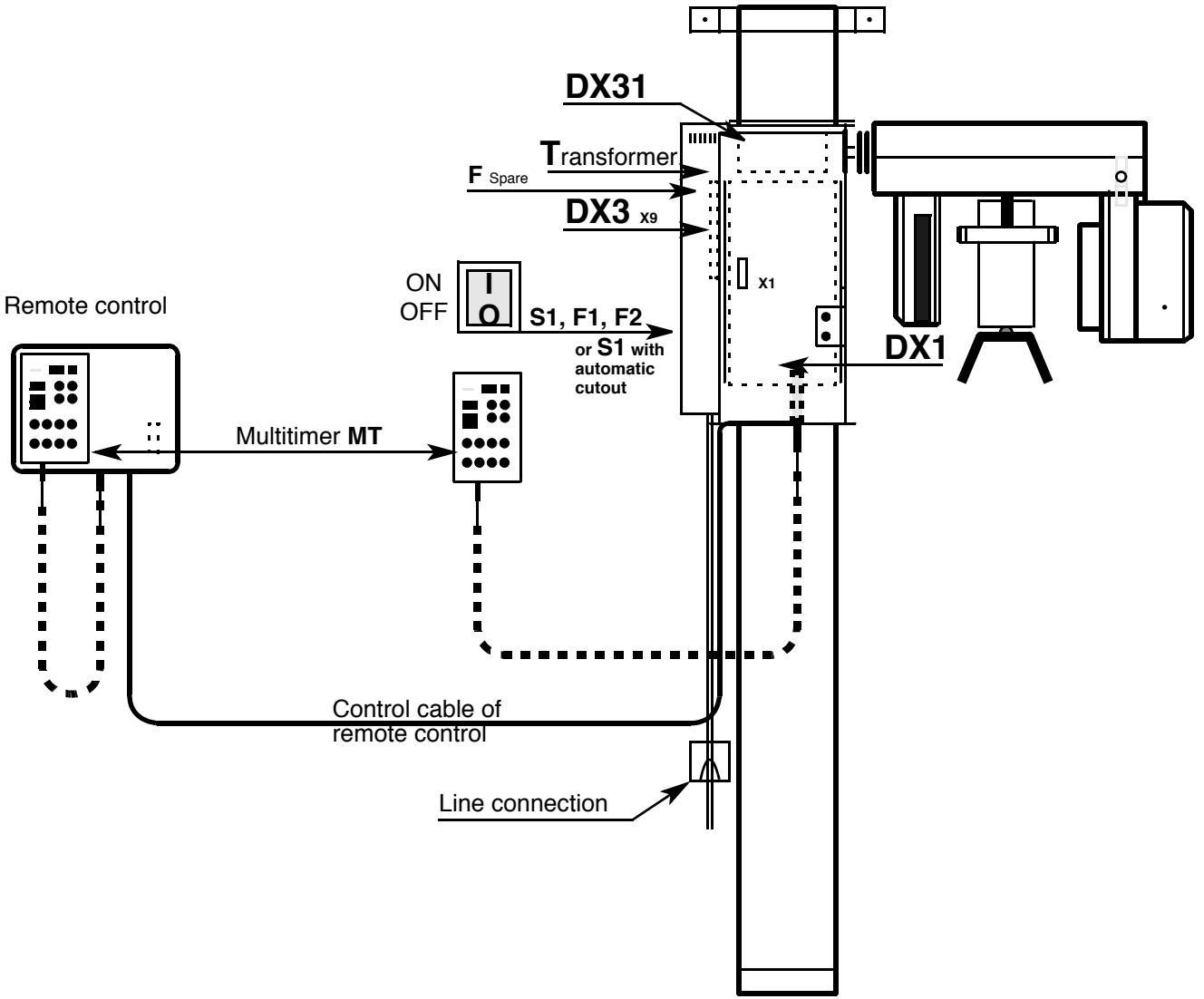

DX31
Transformer
F Spare
DX3 X9
X1
ON
OFF
I
O
S1, F1, F2
or S1 with automatic cutout
DX1
Remote control
Multitimer MT
Control cable of remote control
Line connection

- **Is the line voltage present at the wall socket?**
- **Are the line fuses F1 and F2 (if available) in order? If not: always replace both fuses.**
- **Is the voltage supply o.k., but the Multitimer stays dark nevertheless? See fault localization next page.**

Switch ON
main switch S1
Position **I**

CAUTION: line voltage

Measure line voltage at fuses F1, F2: (if present) or at S1 with automatic cutout: **Line voltage**

no → Connection to wall socket is interrupted.
Check:
- Fuses F1, F2
- Main switch S1
- Terminal strip K1
- Power cable to wall socket
- Line filter
- DX31

yes

DX3

Do LEDs V10-V14 on board DX3 light up?

no → Fuse F1 (DX3) or DX3 defective or Transformer
partly → Replace fuse in failed circuit and trigger fuse again, replace DX3

yes

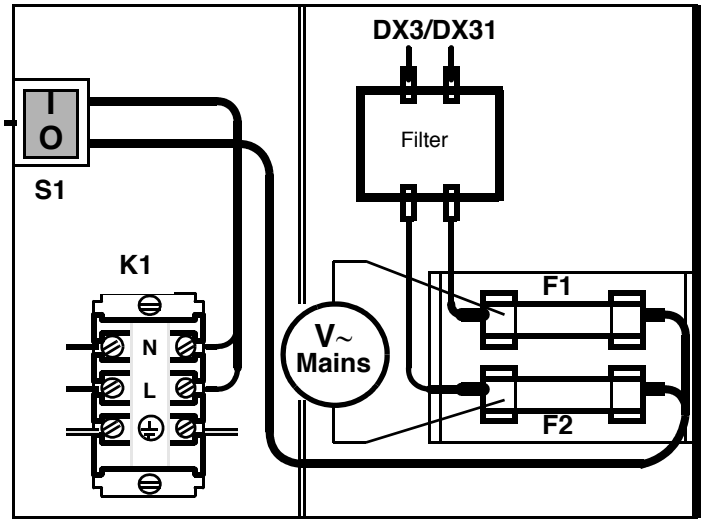
DX3

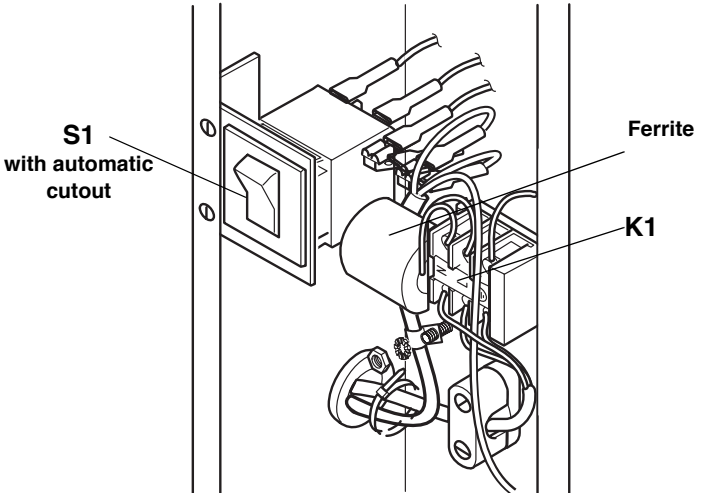
Supply voltages present on DX1?

no → L1A or DX1 defective
Check L1A for continuity

yes

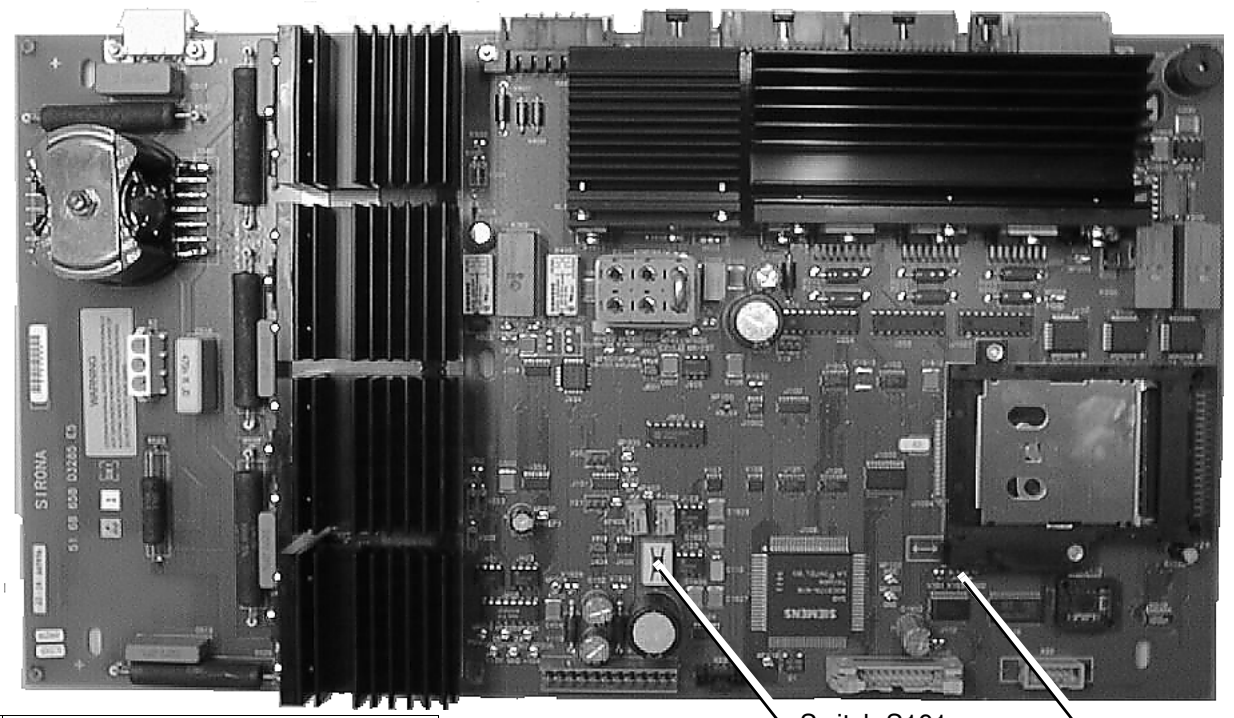
DX1,
check Multitimer and Remote and replace if required.



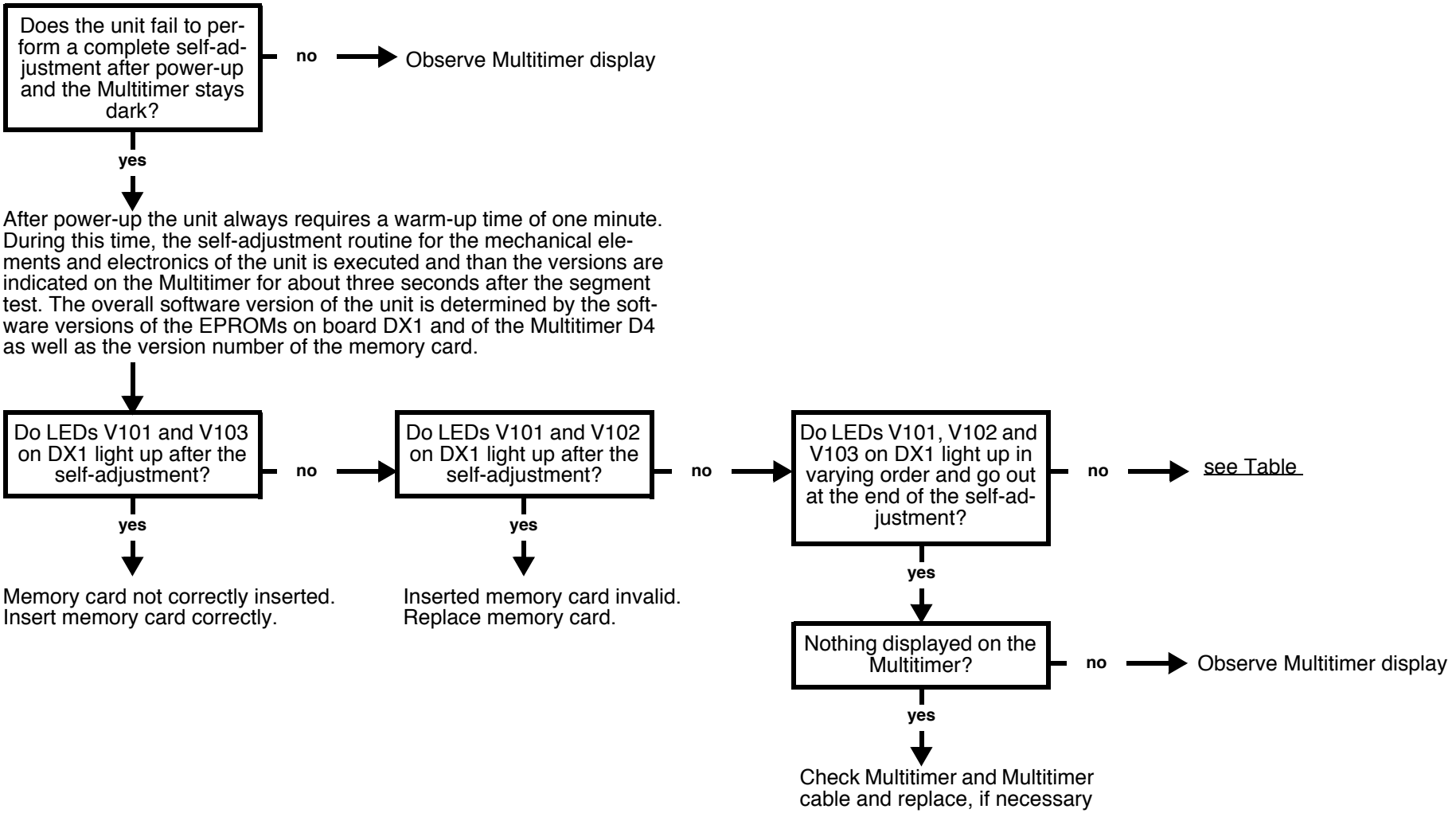


3.1 Unit cannot be switched on, nothing displayed on the Multitimer

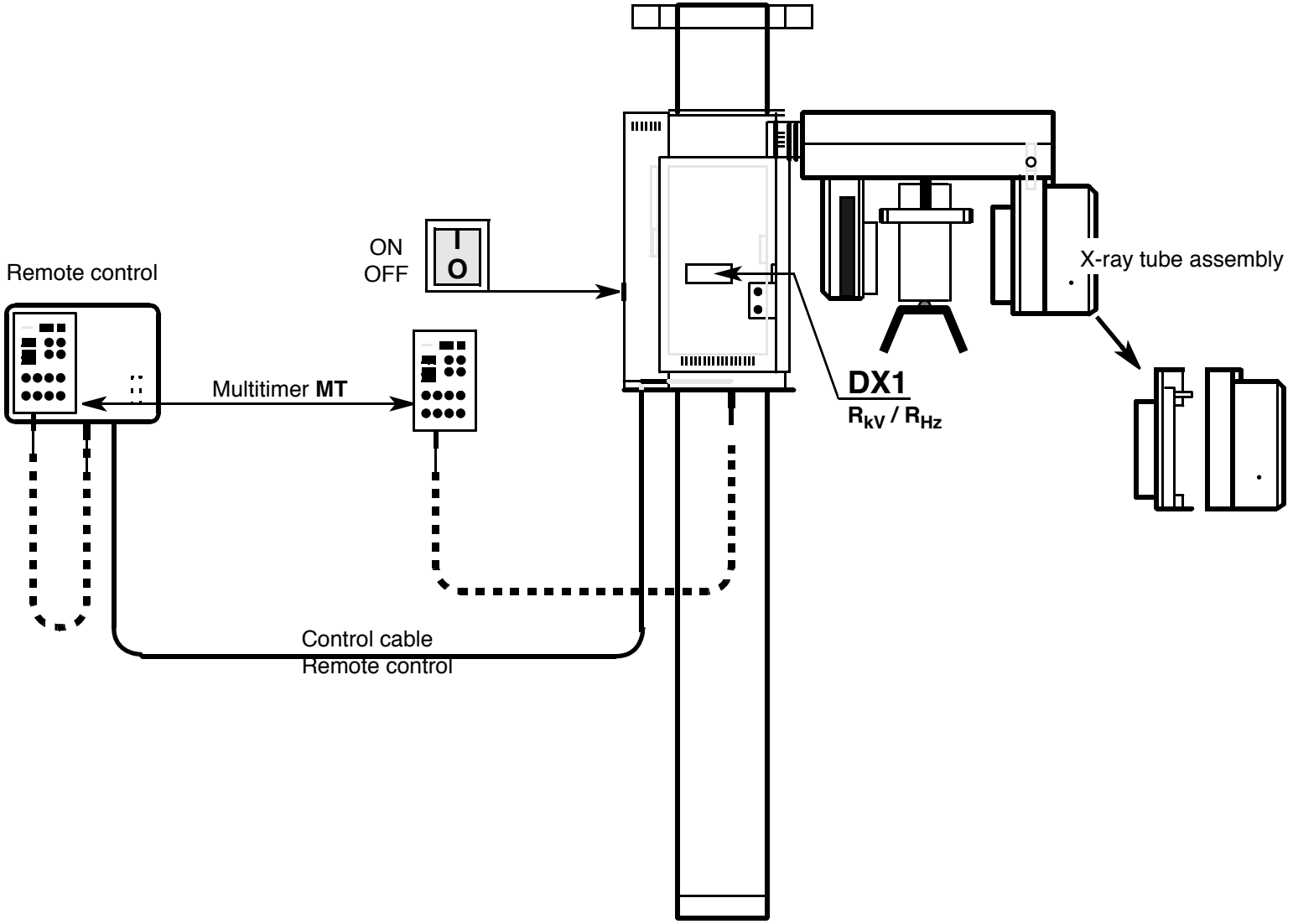
DX1



LED1 V101	LED2 V103	LED3 V102	Description	Required action
on	on	on	Controller not o.k.	Replace and adjust DX1
on	off	off	Internal XRAM not o.k.	Replace and adjust DX1
off	on	off	Internal RAM not o.k.	Replace and adjust DX1
off	off	on	Program memory for Boot software not o.k.	Replace and adjust DX1
flashing	flashing	off	Input clock of 82c54 not o.k.	Replace and adjust DX1
flashing	off	flashing	Vref2 voltage not o.k.	Replace and adjust DX1
off	off	flashing	Malfunction of Watchdog timer	Replace and adjust DX1
off	on	on	Unable to switch to memory card	Replace and adjust DX1
flashing	off	off	Program memory of memory card not o.k.	Memory card incorrect, not or only partially programmed
off	flashing	off	not assigned	
flashing	off	on	not assigned	
off	flashing	on	not assigned	
off	off	off	All tests run without errors	Everything o.k.
on	on	off	No memory card detected	Insert memory card correctly
on	off	on	Memory card not correct	Insert memory card for ORTHOPHOS


Does the unit fail to perform a complete self-adjustment after power-up and the Multitimer stays dark?
no
Observe Multitimer display
yes
After power-up the unit always requires a warm-up time of one minute. During this time, the self-adjustment routine for the mechanical elements and electronics of the unit is executed and than the versions are indicated on the Multitimer for about three seconds after the segment test. The overall software version of the unit is determined by the software versions of the EPROMs on board DX1 and of the Multitimer D4 as well as the version number of the memory card.
Do LEDs V101 and V103 on DX1 light up after the self-adjustment?
no
Do LEDs V101 and V102 on DX1 light up after the self-adjustment?
no
Do LEDs V101, V102 and V103 on DX1 light up in varying order and go out at the end of the self-adjustment?
no
see Table
yes
Memory card not correctly inserted. Insert memory card correctly.
yes
Inserted memory card invalid. Replace memory card.
yes
Nothing displayed on the Multitimer?
no
Observe Multitimer display
yes
Check Multitimer and Multitimer cable and replace, if necessary

3.1 Unit cannot be switched on, nothing displayed on the Multitimer

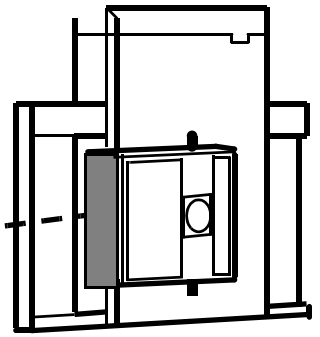

Remote control
ON
OFF
I
O
Multitimer **MT**
X-ray tube assembly
DX1
R_{kV} / R_{Hz}
Control cable
Remote control

- **The processing equipment is in working order.**
- **The X-ray radiation indicator lights up and the acoustic signal is emitted when the release button is pressed.**
- **The X-ray beam is correctly adjusted. See chapter entitled 'Checking and adjusting the X-ray beam for panoramic exposures'.**
- **The mA meter must be in working order, i.e. it must have been checked on a functioning ORTHOPHOS 3.**

Measure tube current:
See chapter on
'**Checking the tube current**'.
Are 10mA±0,5mA attained?

no → Replace board DX1 and
• **'Adjust board DX1'**

yes



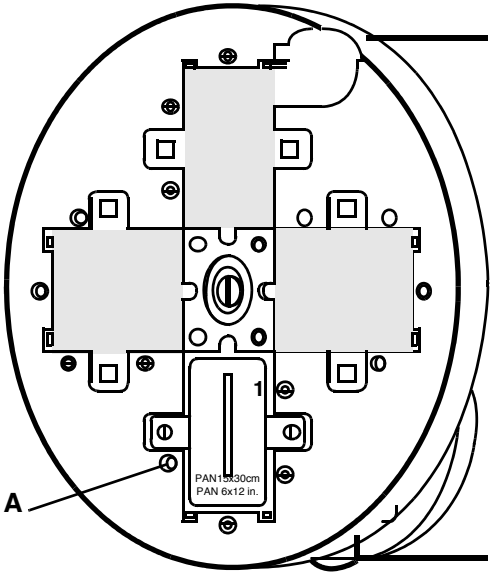
Check kV value with MINI X kV meter:

- Fasten kV meter to secondary diaphragm: Sensor area in beam path (slot).
- Rotate empty window of diaphragm wheel in front of beam path. (Remove lokking screw A for this purpose. Not available on ORTHOPHOS 3C).
- Select Service routine S.02 was described in the chapter '**Selecting the Service routine**'.
- Set the radiation time to **2 seconds** and the power to **70kV** on the multitimer.
- Release **RADIATION** and read off the kV value on the kV meter.

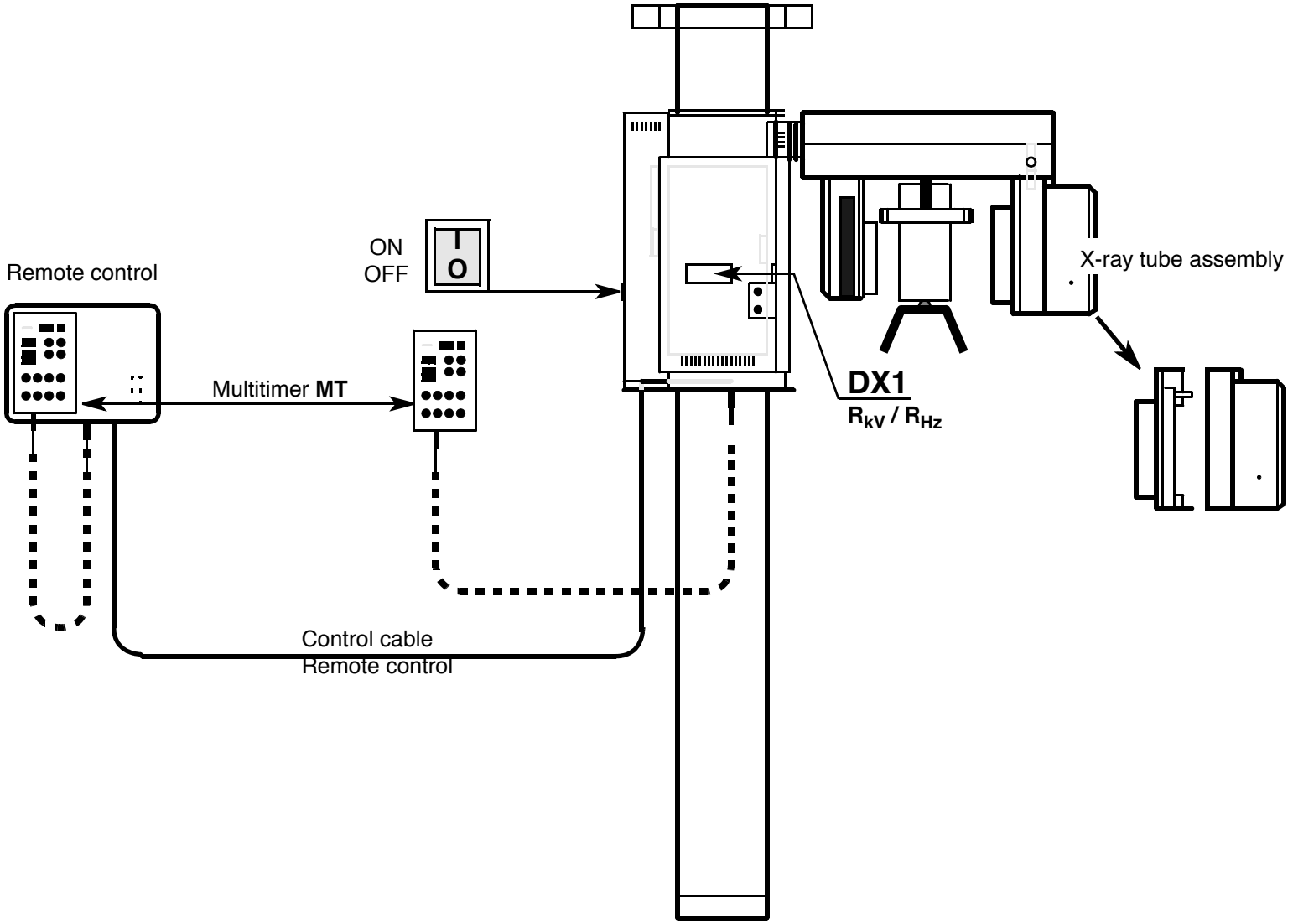
No display on the kV meter.
Is the sensor area properly
(fully) illuminated?

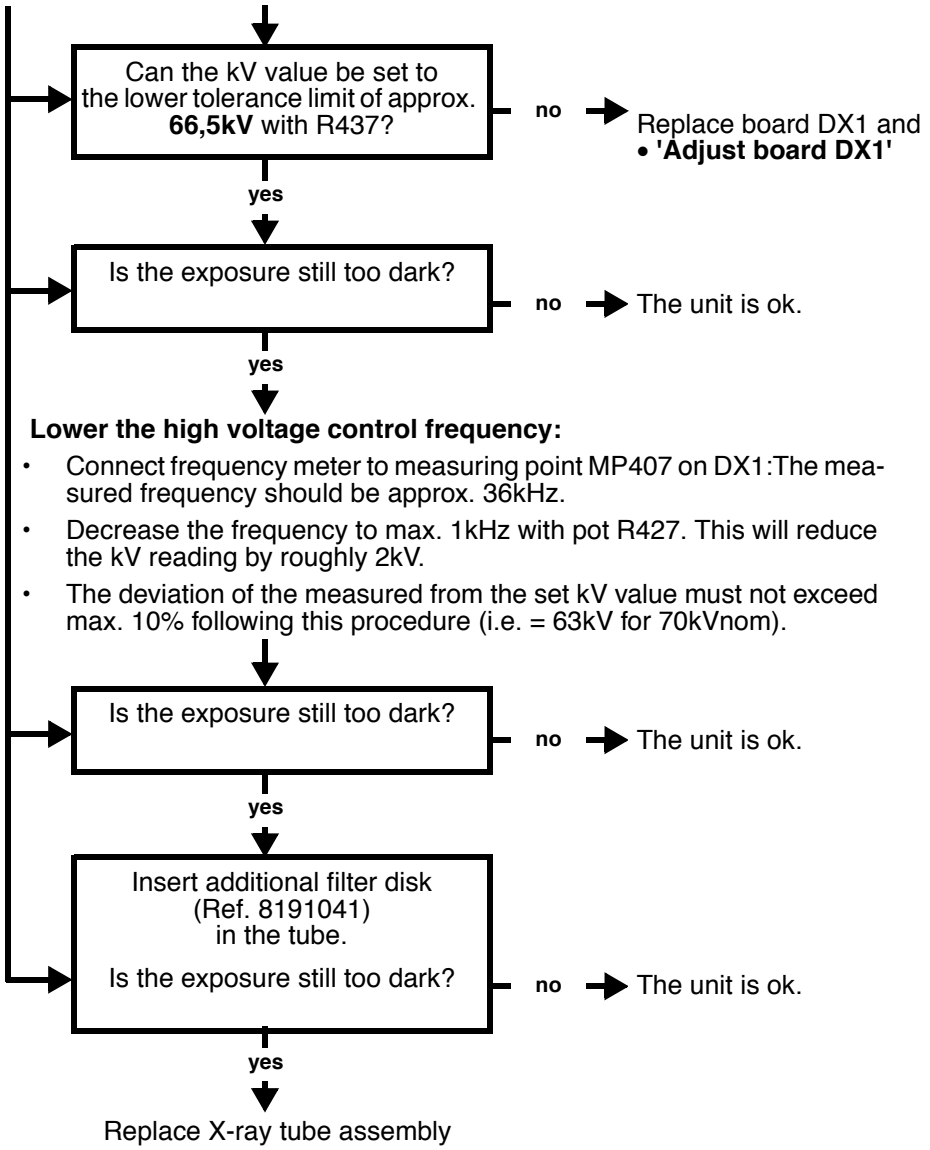
no → Correct position of kV meter.
Check exposure.

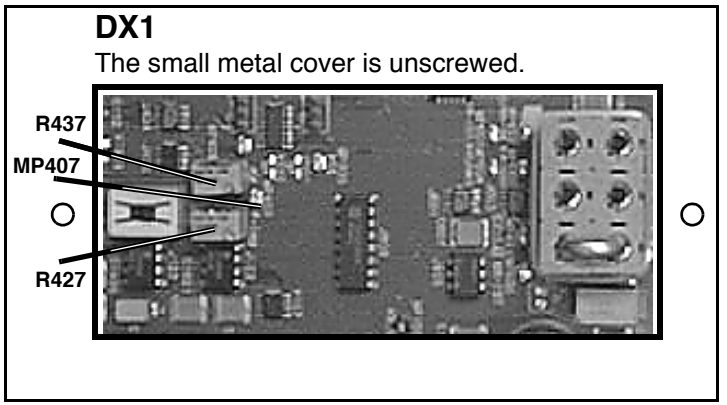
yes

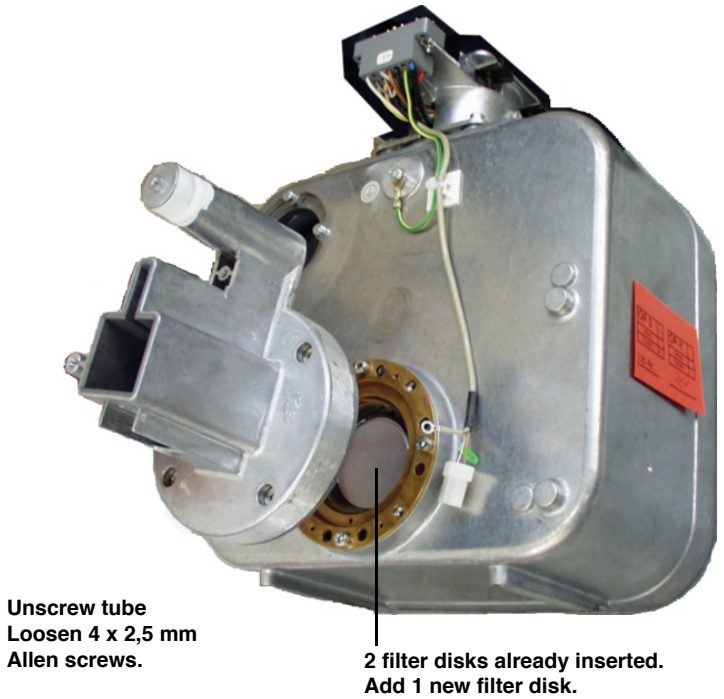


3.1 AExposure too dark

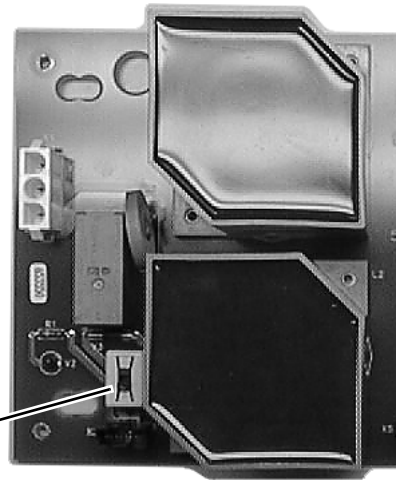

Remote control
ON
OFF
I
O
Multitimer **MT**
X-ray tube assembly
DX1
R_{kV} / R_{Hz}
Control cable
Remote control

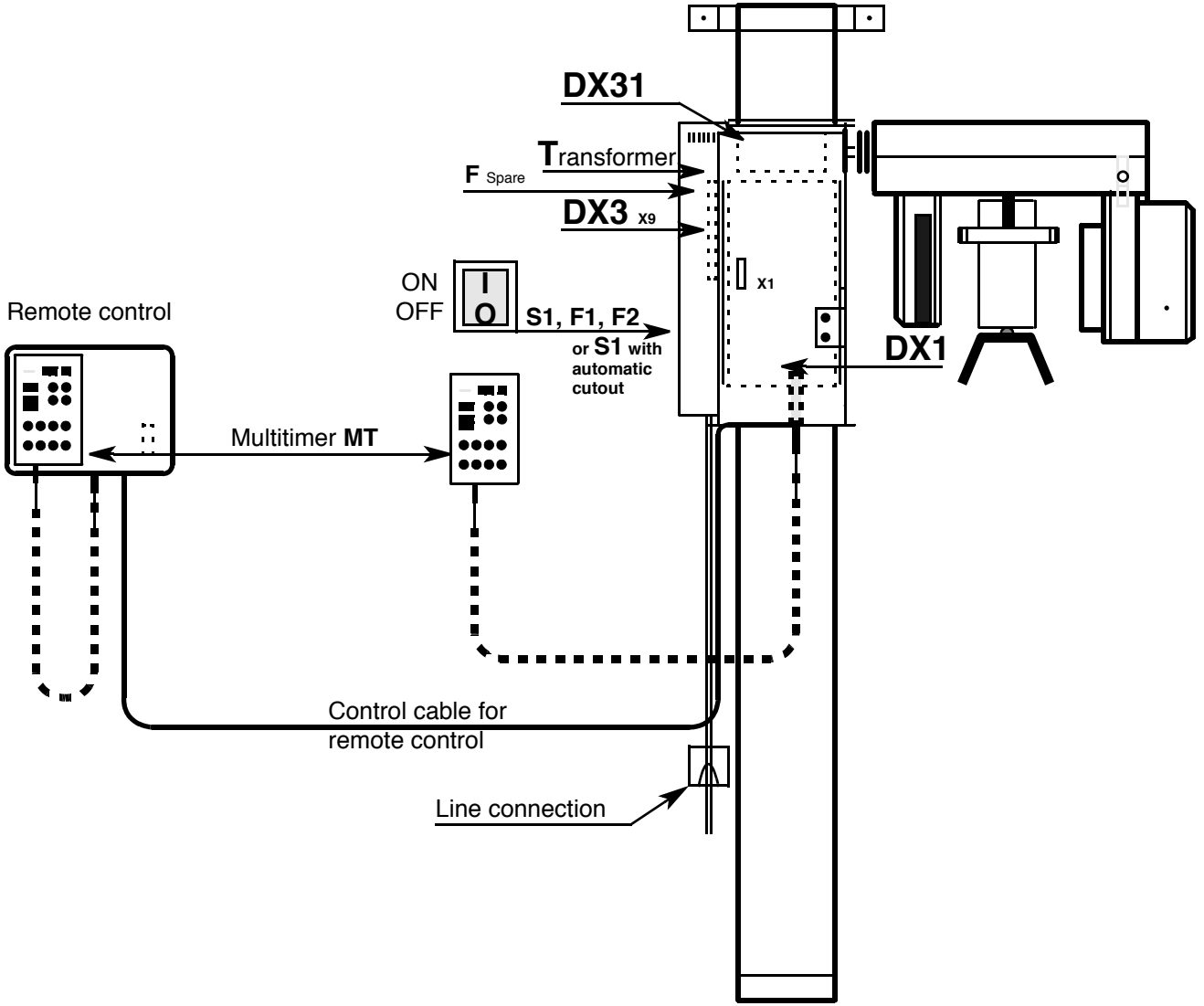

Can the kV value be set to the lower tolerance limit of approx. **66,5kV** with R437?
no
Replace board DX1 and
• **'Adjust board DX1'**
yes
Is the exposure still too dark?
no
The unit is ok.
yes
Lower the high voltage control frequency:
• Connect frequency meter to measuring point MP407 on DX1:The measured frequency should be approx. 36kHz.
• Decrease the frequency to max. 1kHz with pot R427. This will reduce the kV reading by roughly 2kV.
• The deviation of the measured from the set kV value must not exceed max. 10% following this procedure (i.e. = 63kV for 70kVnom).
Is the exposure still too dark?
no
The unit is ok.
yes
Insert additional filter disk (Ref. 8191041) in the tube.
Is the exposure still too dark?
no
The unit is ok.
yes
Replace X-ray tube assembly



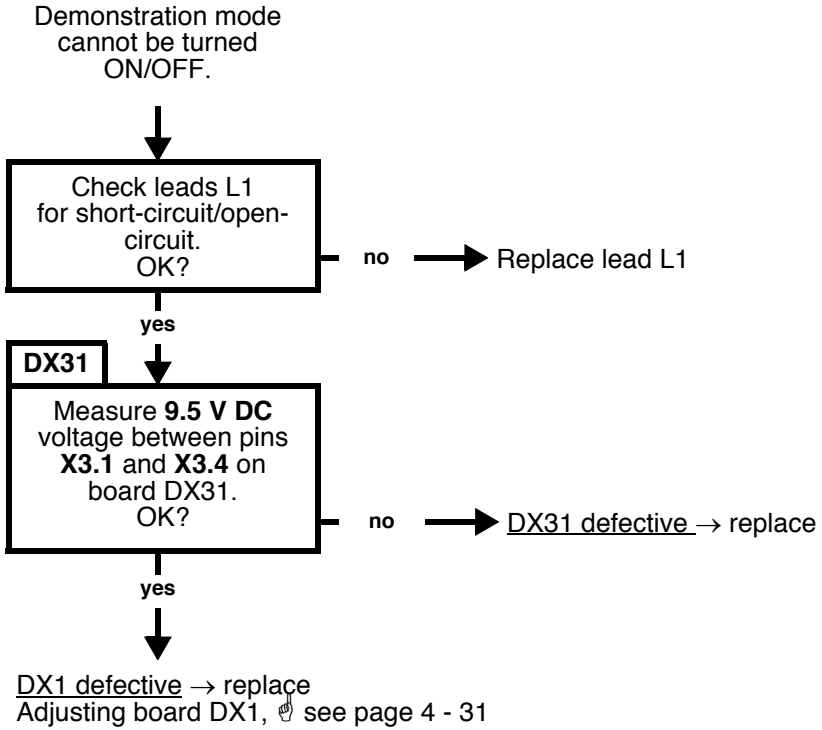


3.1 AExposure too dark

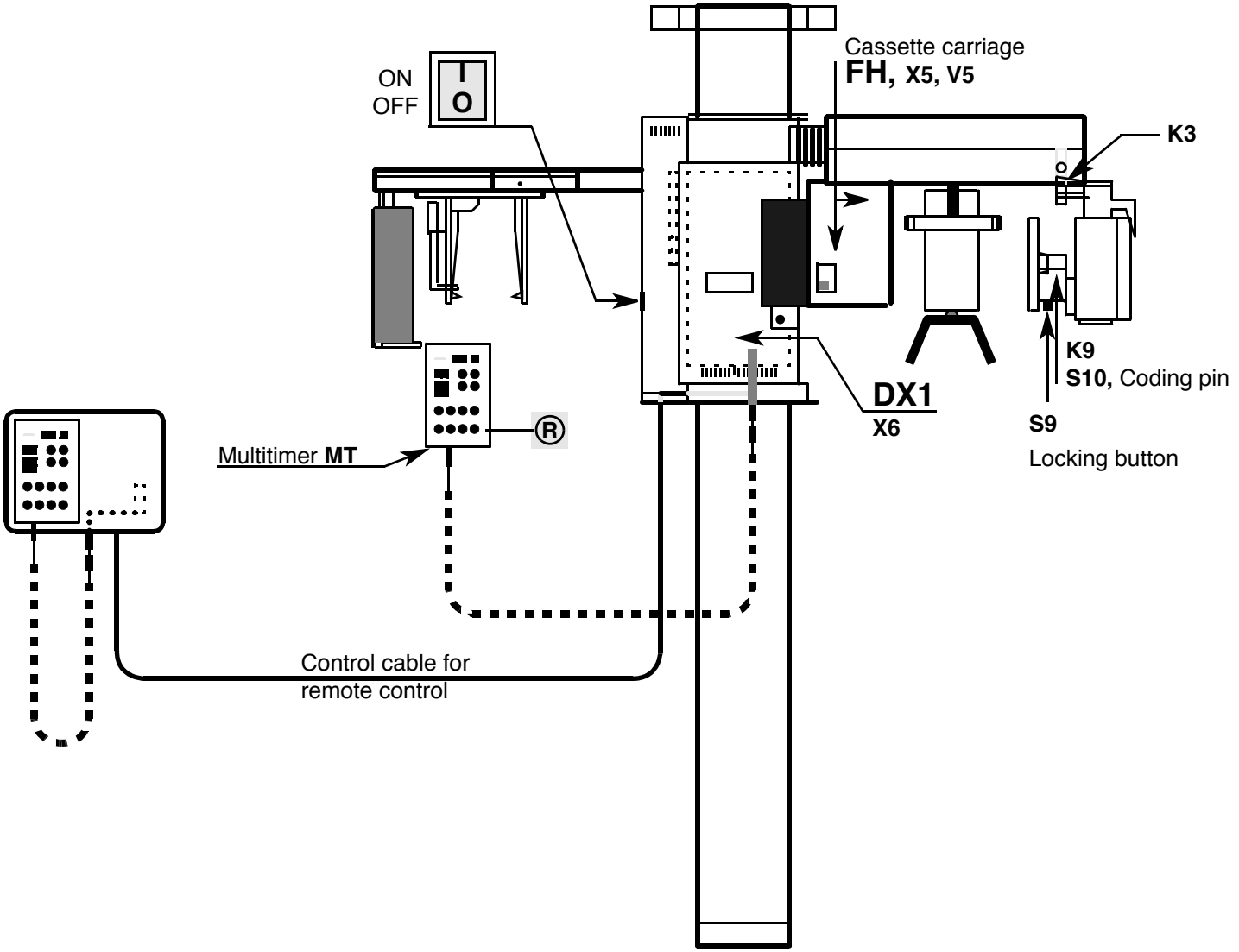

DX31
S1/S88


DX31
Transformer
F Spare
DX3 X9
X1
ON
OFF
I
O
S1, F1, F2
or S1 with
automatic
cutout
DX1
Remote control
Multitimer MT
Control cable for
remote control
Line connection

- **Check the position of the sliding switch S1 on board DX31.**
  After turning the unit on and completion of the self-adjustment process, S.88 must be visible on the program display for about 4 sec with the switch on the Multitimer in position 2. The same applies when switching over from position 1 to position 2.


Demonstration mode cannot be turned ON/OFF.
Check leads L1 for short-circuit/open-circuit. OK?
no
Replace lead L1
yes
DX31
Measure 9.5 V DC voltage between pins X3.1 and X3.4 on board DX31. OK?
no
DX31 defective → replace
yes
DX1 defective → replace
Adjusting board DX1, see page 4 - 31

3.2 Demonstration mode cannot be turned ON/OFF


ON
OFF
I
O
Cassette carriage
FH, X5, V5
K3
K9
S10, Coding pin
S9
Locking button
DX1
X6
Multitimer MT
Control cable for
remote control

- **Check for operating errors according to ORTHOPHOS 3 Ceph Operating Instructions, section"Preparing the Teleradiography Exposure".**
- **Are the illuminated H3 help messages of no help !?**

MT

Set diaphragm 3 or 4 on wheel.

Does display **C** on Multitimer light up?*

no → Possible faults:

* See ORTHOPHOS 3 Ceph Operating Instructions, section "Preparing the Tele-Exposure"

yes

Panorama cassette holder is swivelled out up to stop.

Help message **H3 11** lights up after pressing release button.

Light barrier V5 defective, replace.

V5: plug X5 on board FH in cassette carriage.

1)The diaphragm coding pin on the rear side of the wheel does not actuate microswitch **S10** correctly:
Check coding pin and microswitch.

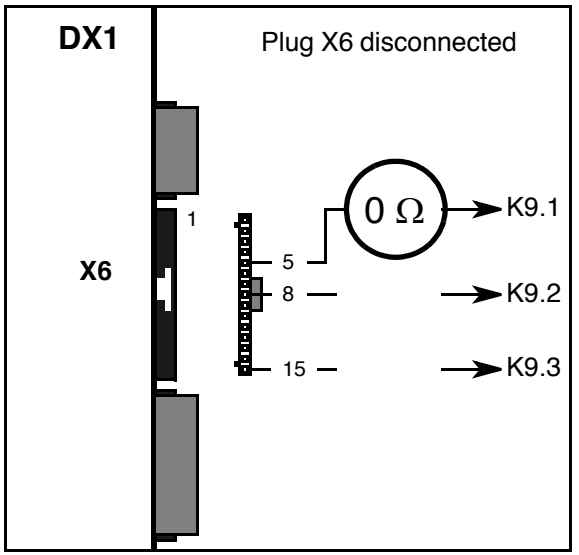
If both are OK, check microswitch **lead** from plug **K9** via **K3** to plug **X6** on board **DX1** for continuity.
K9.1 (white) → **K3.9** (green/white) → **X6.5** (green/white)
K9.2 (red) → **K3.10** (gray/white) → **X6.8** (gray/white)

If the lead is OK:
Replace board DX1 and perform • **'Adjusting PC Board DX1'**.

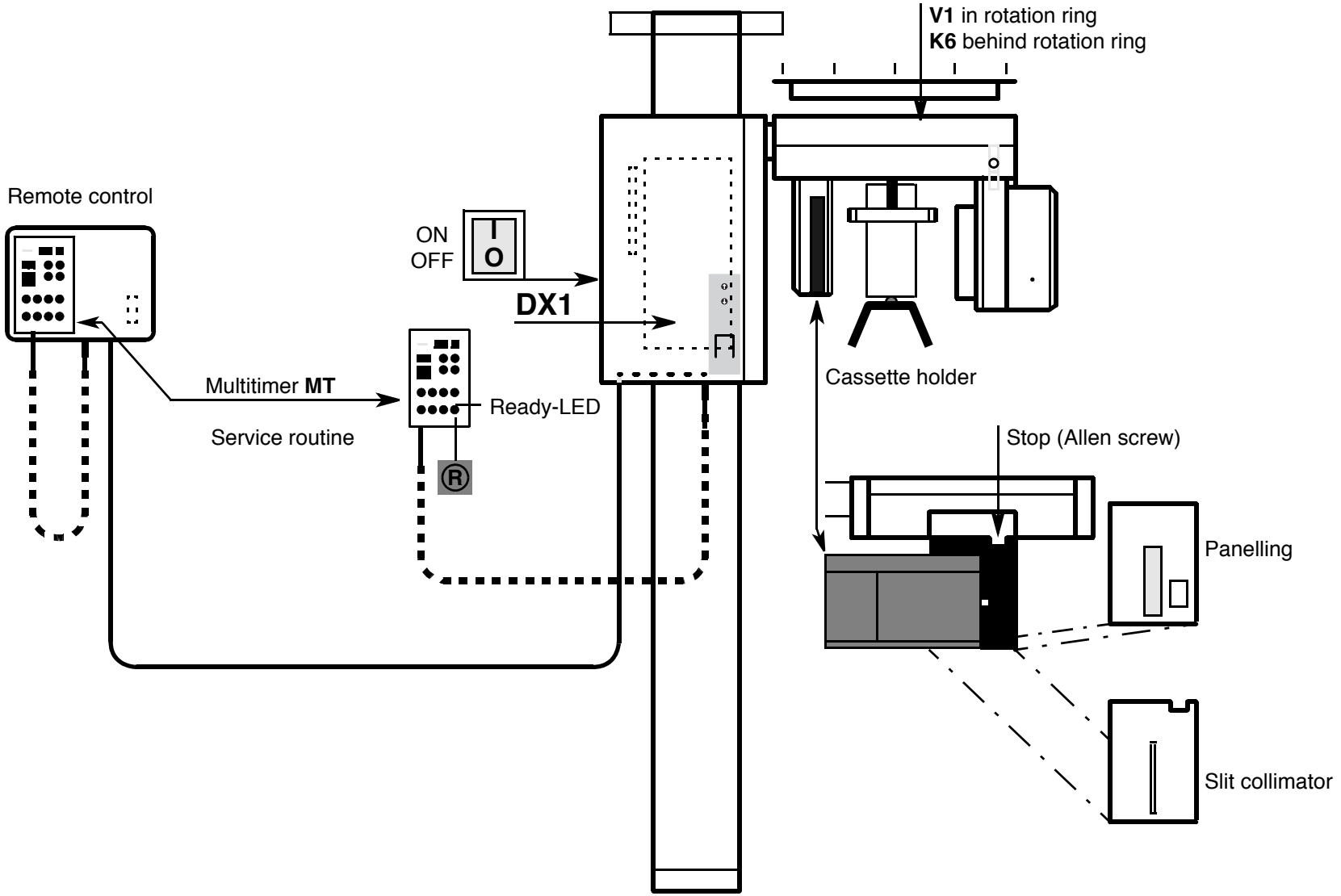
2)The stop button does not actuate microswitch **S9** correctly.
Check stop mechanism and microswitch.

If both are OK, check microswitch lead from plug **K9** via **K3** to plug **X6** on board **DX1** for continuity.
K9.1 (white) → **K3.9** (green/white) → **X6.5** (green/white)
K9.3 (yellow) → **K3.3** (gray/blue) → **X6.15** (gray/blue)

If the lead is OK:
Replace board DX1 and perform • **'Adjusting PC Board DX1'**.



3.3 The Teleradiography exposure is not released


V1 in rotation ring
K6 behind rotation ring
Remote control
ON
OFF
I
O
DX1
Multitimer MT
Service routine
Ready-LED
Cassette holder
Stop (Allen screw)
Panelling
Slit collimator

Elimination of fault: Help message H3 04. The cassette holder is not in Panorama position.

- **Swivel the cassette holder for Panorama radiography in up to the stop!**
  The Ready LED above the Return key R on the Multitimer continues flashing..

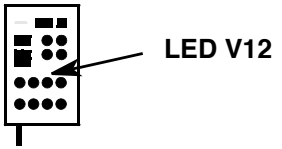
Eliminate the fault with Service Routine S.16, test step 03
See section "**Service Routine S.16**" see page 5 - 45

In test step 03 LED V12 above the patient symbol key on the Multitimer must be lit up.

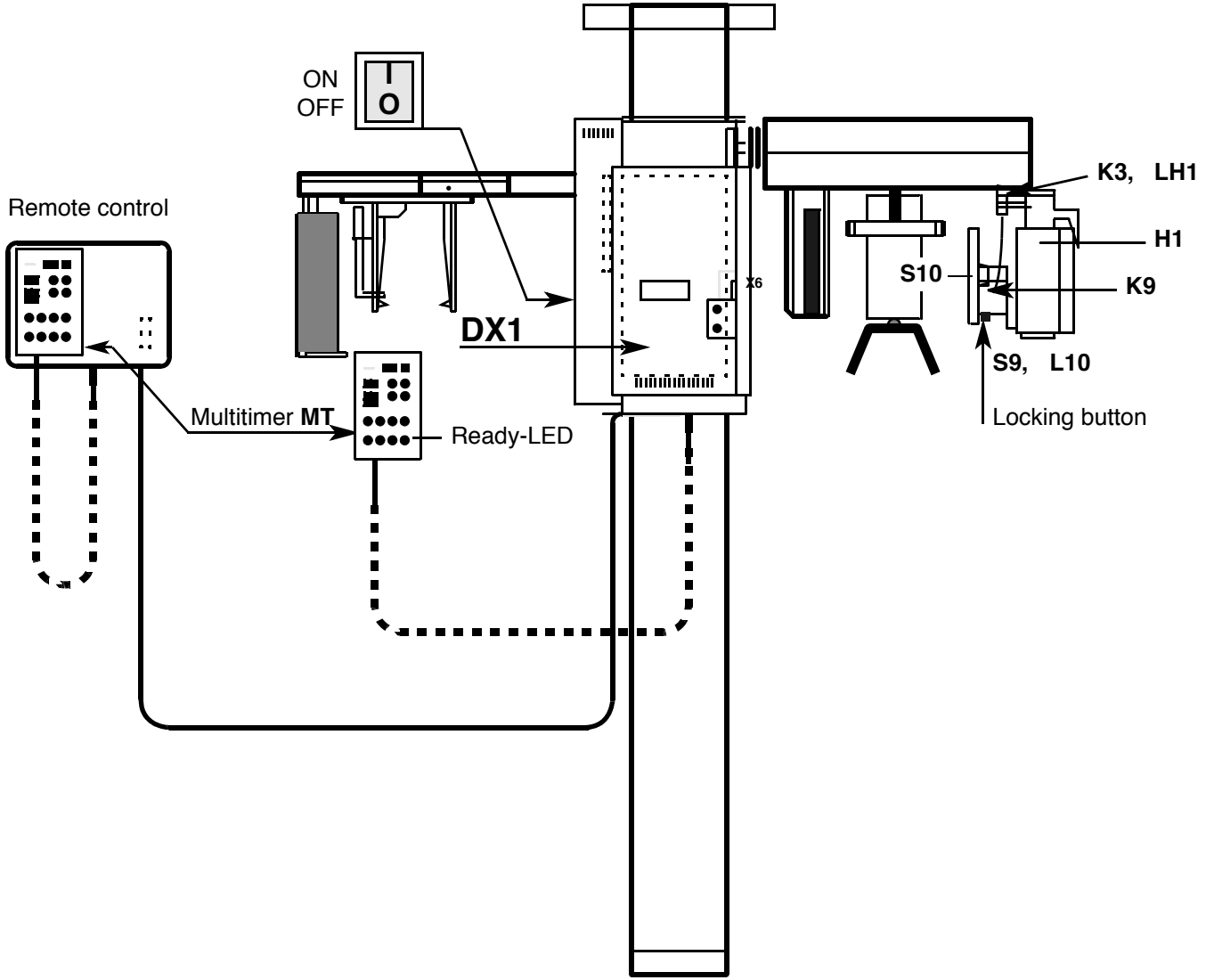
If this LED is not lit up:

Possible faults

1. The stop (hexagonal socket screw) for the cassette holder is shifted (unscrew covering and then slit collimator). Move to correct position.
2. Light barrier V4 defective or disturbance in lead. **Test / replace / repair.**



3.4 Correcting errors of help messages H3 04.


ON
OFF
I
O
Remote control
DX1
X6
K3, LH1
H1
S10
K9
S9, L10
Locking button
Multitimer MT
Ready-LED

Correcting error of help message H3 06. The locking button on the diaphragm wheel is not engaged.

- **Is connector K9 correctly inserted at the X-ray tube assembly?**
- **Has the locking button correctly engaged on the diaphragm wheel? (if present, otherwise a n L 10K short-circuit jumper is present)**
  Set Panorama diaphragm, screw down tightly to ORTHOPHOS 3 DS.
  The Ready LED above the R key on the Multitimer is flashing.

X-ray tube assembly

Is the function of switch S9 mechanically impeded?

no →

yes ↓

Correct the fault.

If required, replace switch S9 and/or cable L10.

X-ray tube assembly

Check switching function of S9 incl. cable L10 up to connector K9. OK?

no → Cable L10 defective. Repair/replace.

yes ↓

K9→K3

Check continuity from connector K9 to K3 on. OK?

Check LH1 continuity from:
Connector K9.1 to K3.9
Connector K9.3 to K3.3

no → Cable LH1defective. Repair/replace.

yes ↓

K3→DX1

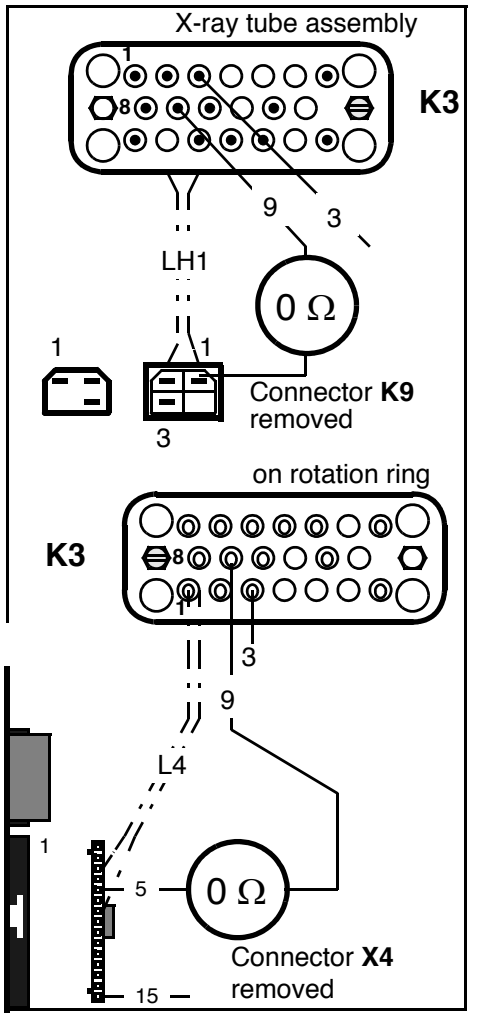
Check continuity from connector K3 to X6 on DX1. OK?

Check L4 continuity from:
Connector K3.9 to X6.5
Connector K3.3 to X6.15

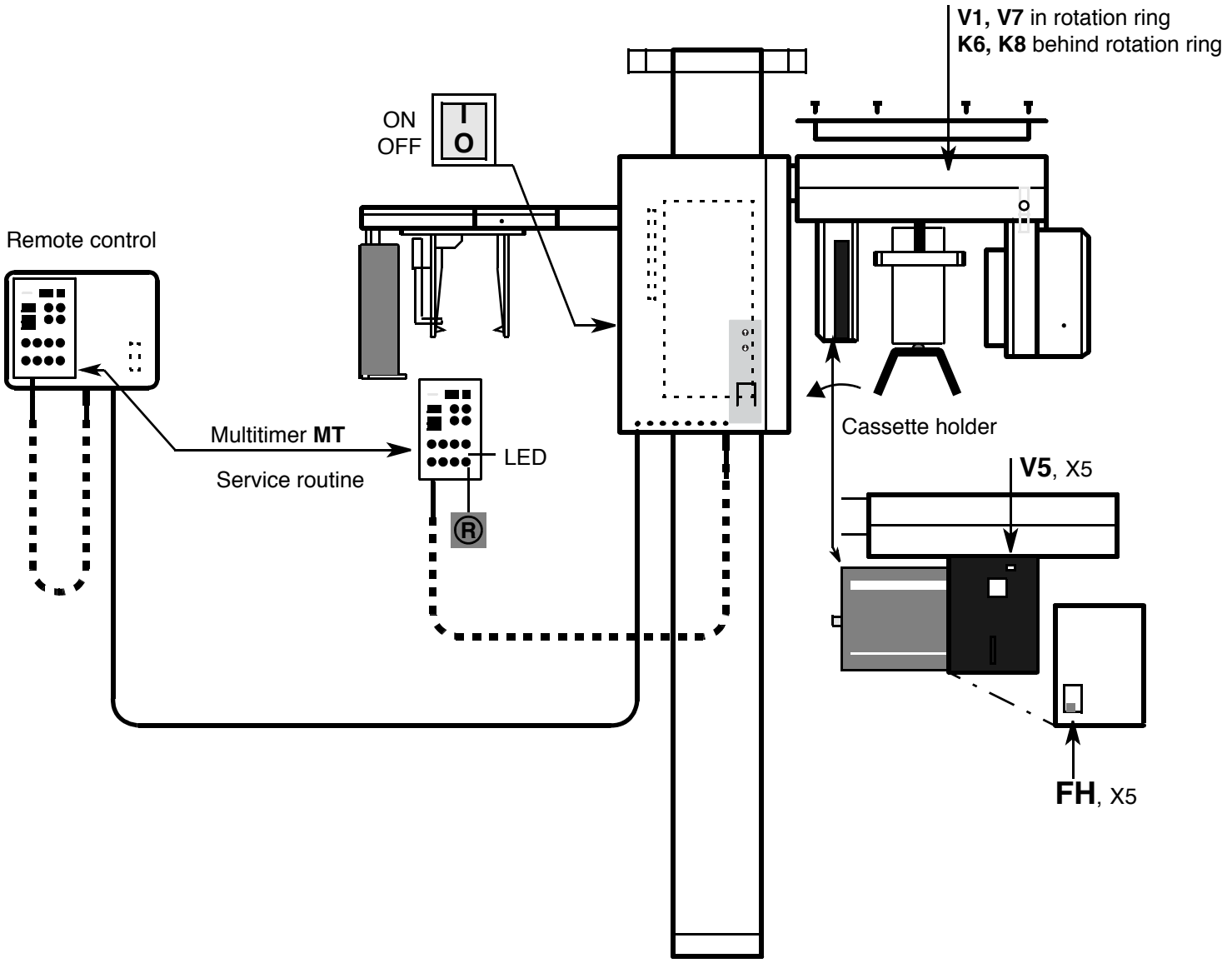
no → Check plug contact. Lead L4 defective. Repair/replace

yes ↓

Replace board DX1
• '**Adjusting board DX1**',
see page 4 - 31



3.5 Correcting errors of help messages H3 06.


V1, V7 in rotation ring
K6, K8 behind rotation ring
ON
OFF
I
O
Remote control
Multitimer MT
Service routine
LED
R
Cassette holder
V5, X5
FH, X5

Elimination of fault: Help message H3 11

- **Swivel the cassette holder out to Ceph position up to the stop.**
  The Ready LED above the Return key R on the Multitimer continues flashing.

Eliminate the fault with Service Routine S.16, test step 03

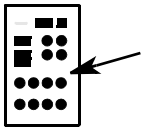
See section "**Service Routine S.16"**

In test step 03 LED V11 above the patient symbol key on the Multitimer must be lit up.

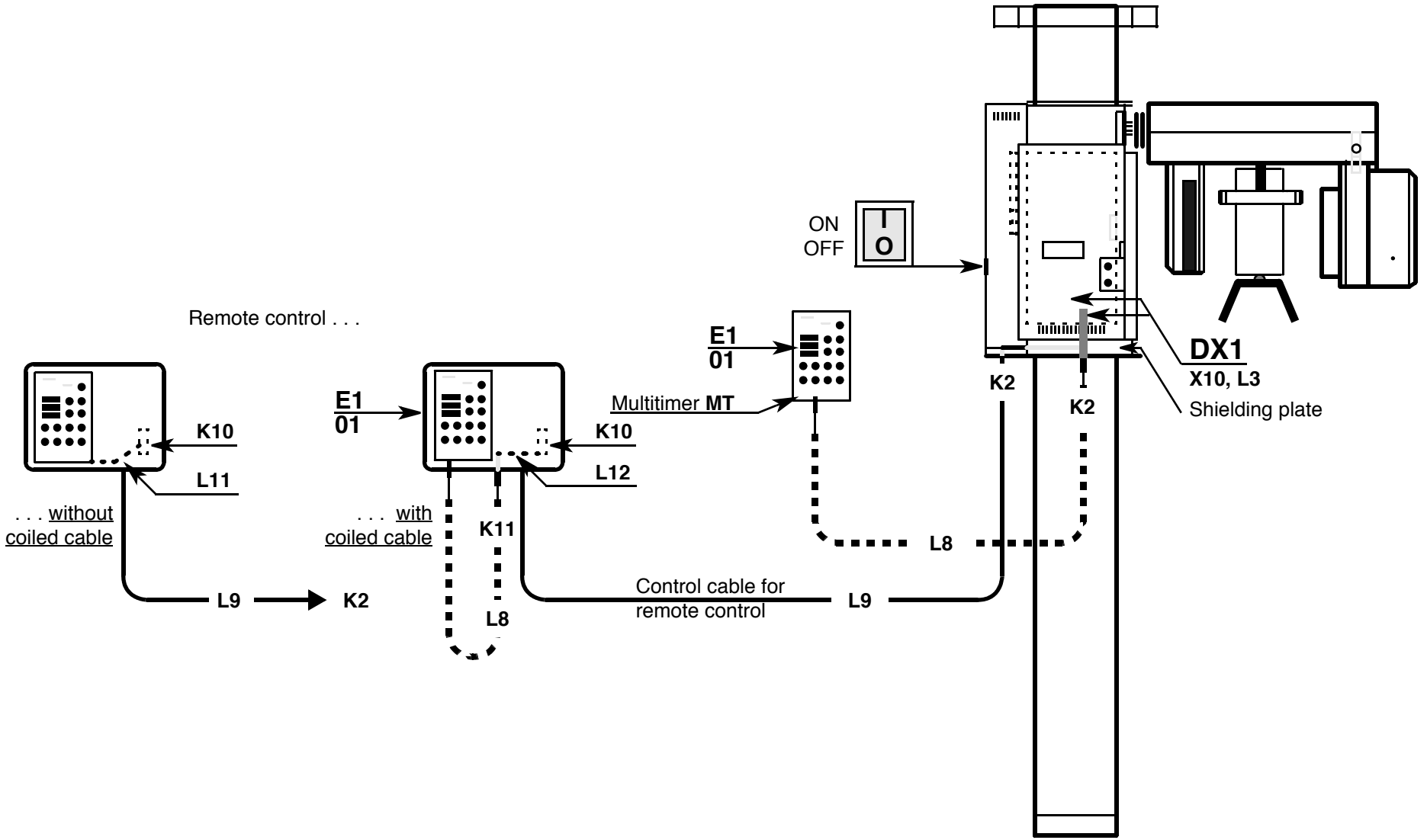
If this LED is not lit up:

Possible faults

1. Light barrier V5 is not interrupted with the cassette holder swivelled out.
   Check and correct switching tab and mechanism.
2. Light barrier V5 (X5 on FH) defective, or disturbance in lead.
   Test / repair / replace
3. Fault on board DX1.
   Replace board DX1 and perform • '**Adjusting PC board DX1'**.



3.6 Correcting errors of help messages H3 11.


ON
OFF
I
O
DX1
X10, L3
Shielding plate
K2
K2
Remote control . . .
E1
01
K10
L11
. . . without
coiled cable
L9
K2
E1
01
K10
L12
. . . with
coiled cable
K11
L8
E1
01
Multitimer MT
L8
Control cable for
remote control
L9

- **After power ON, the unit performs a self-adjustment routine.**
  No key must be pressed on the Multitimer during the self-adjustment!

MT

Was a key pressed on the Multitimer during the unit self-adjustment?

no → Check cables for short-circuit (with E1 01) and for continuity (with E1 02 and E2 03).*

yes

Do not press any key.

Operating error is corrected.

K2

Check cable L3 at K2 for short-circuit - continuity. Is cable L3 OK?

no → Replace L3

Check between all pins on plug K2

yes

K2

Check cable L8 at K2 for short-circuit - continuity. Is cable L8 OK?

no → Replace L8

Check between all pins on plug K2

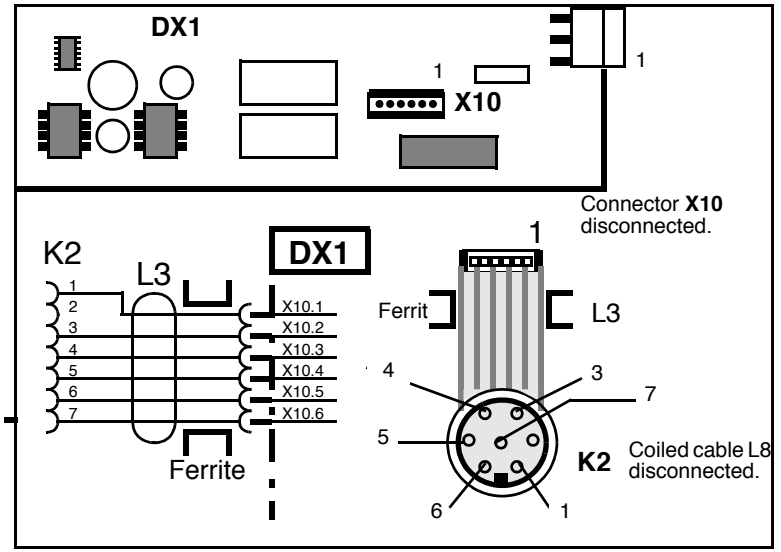
yes

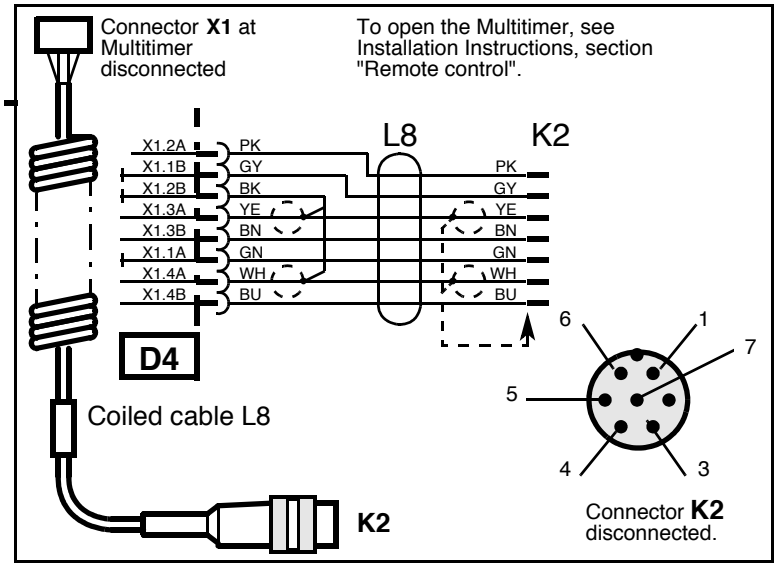
Multitimer is defective.
Replace

If the error persists:

Replace board DX1

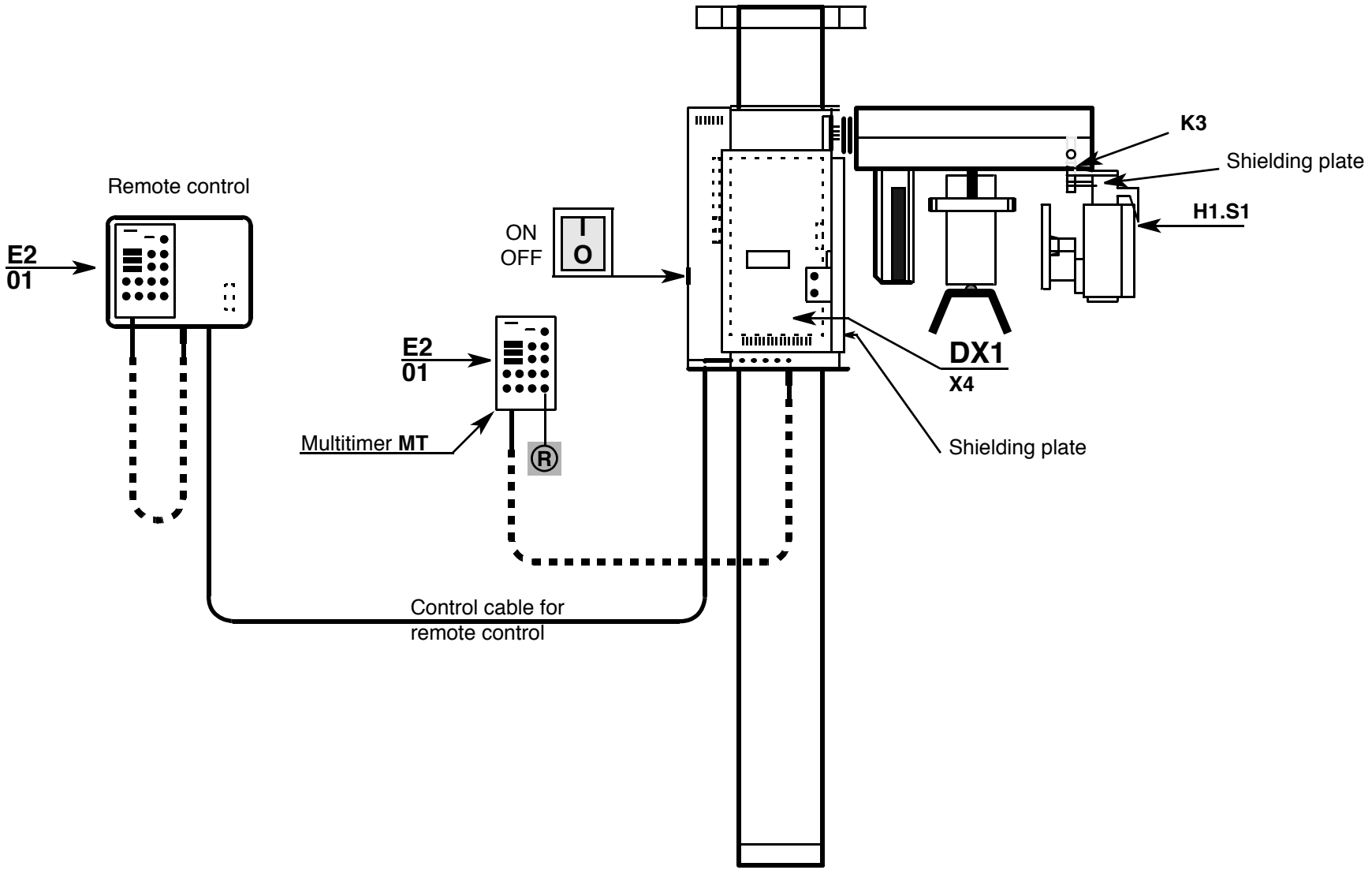
- **Perform 'Adjusting board DX1',** ☝ see page 4 - 31





* If a remote control is provided:
Connect the Multitimer to the unit (connector K2 below the shielding plate).
If the error no longer occurs, check the cable L9 for short-circuit. With remote control without coiled cable, also check cable L11.

3.7 Correcting error of messages E1 01, E1 02, E2 03: Signal paths to control board DX1 are interrupted.


Remote control
E2
01
ON
OFF
I
O
E2
01
Multitimer MT
R
K3
Shielding plate
H1.S1
DX1
X4
Shielding plate
Control cable for
remote control

- **Thermo switch H1.S1 has responded. Wait for it to close again (contact open, check connector K3). Press the R key on the Multitimer. The error message is no longer displayed.**

MT

Press the exposure button.

Is error **E2 01** displayed?

no → The unit is OK.

yes

Switch the unit OFF

X-ray tube assy

Check switch H1.S1 for continuity.
Is switch contact closed?

no

1. X-ray tube assembly is overloaded (surface ≥ 65°C), allow to cool down (1 – 2 hours.)

Check again for continuity at H1.S1.
Unit is OK

2. Switch H1.S1 is defective; replace.

yes

Cable test: check for continuity from H1.S1 to connector X4 on DX1.

There must be continuity from **X4.5** to **X4.6**.

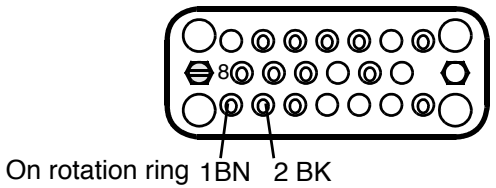
Is there continuity?

no → Locate and repair the cable interruption.
Test sections
X4.5 to **K3.1** (BN); **K3.1** (YE) to **H1.S1**
X4.6 to **K3.2** (BK); **K3.2** (YE) to **H1.S1**.
First remove X-ray tube assembly. Disconnect K3.

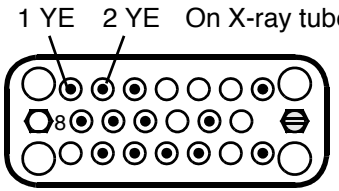
yes

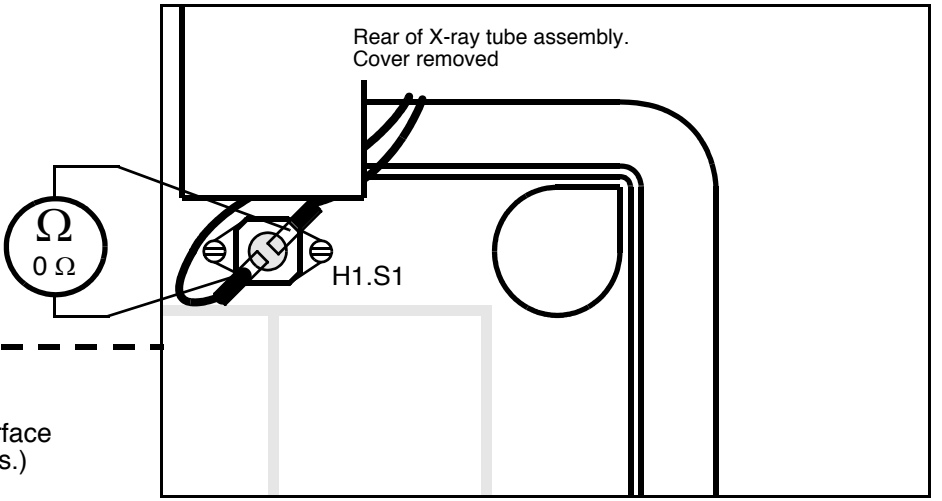
Replace board DX1.

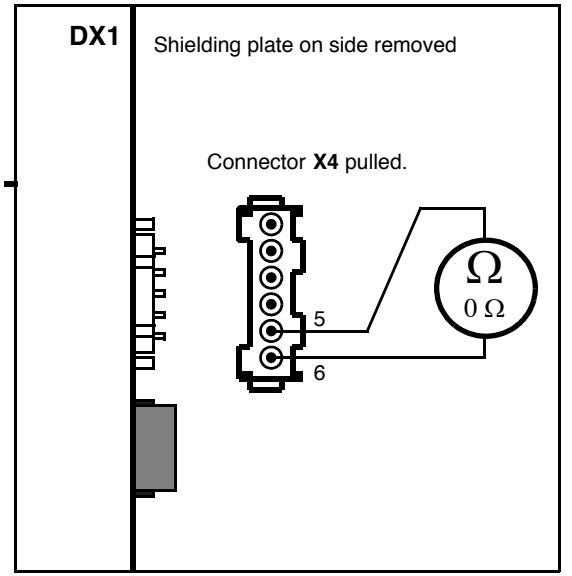
- **Perform 'Adjusting board DX1',** see page 4 - 31



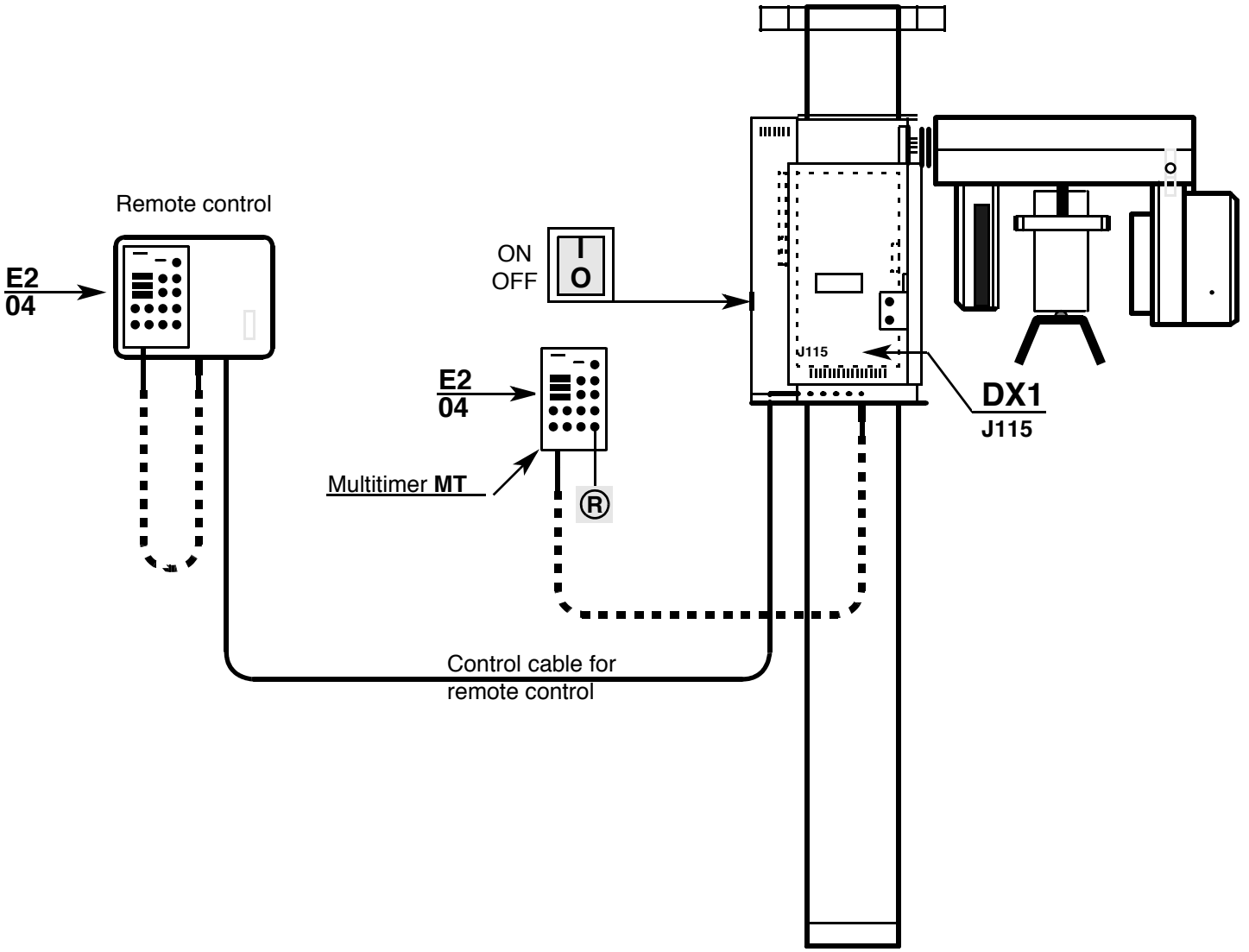
K3



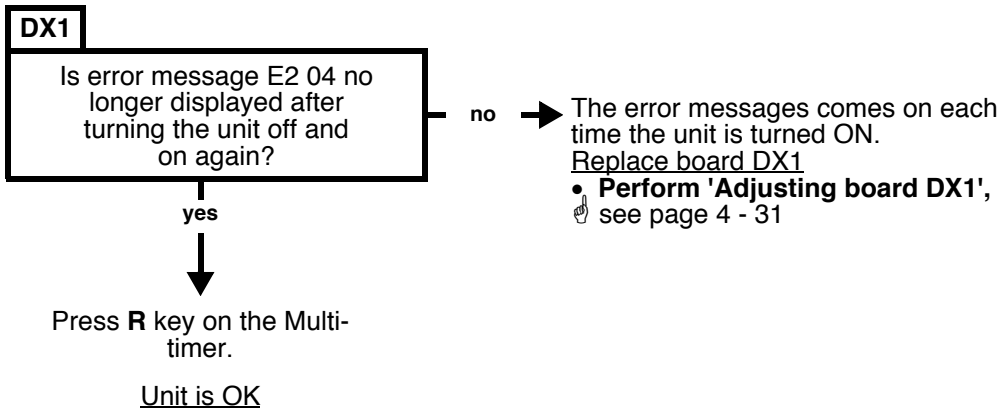




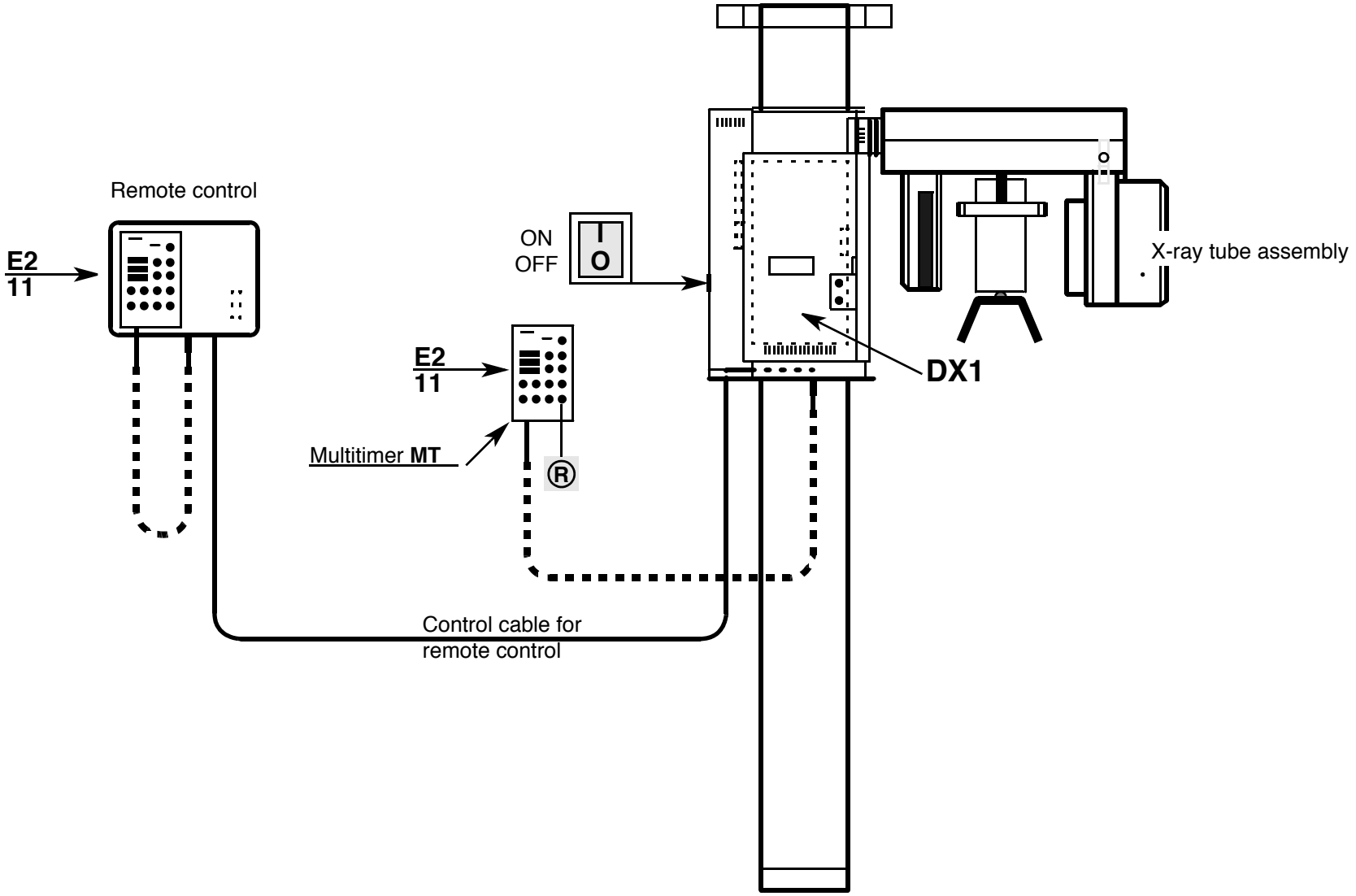
3.8 Correcting error of message E2 01: X-ray tube assembly overheated.


Remote control
E2
04
ON
OFF
I
O
E2
04
Multitimer MT
®
J115
DX1
J115
Control cable for
remote control

- **Zero power range of EEPROM J115 is invalid or destroyed.**


DX1
Is error message E2 04 no longer displayed after turning the unit off and on again?
no
The error messages comes on each time the unit is turned ON.
Replace board DX1
• Perform 'Adjusting board DX1',
see page 4 - 31
yes
Press **R** key on the Multi-timer.
Unit is OK

3.9 Correcting error of message E2 04: Zero power range has been re-initialized.


Remote control
E2
11
ON
OFF
I
O
X-ray tube assembly
E2
11
DX1
Multitimer MT
Control cable for
remote control

- **KV_{max} has been exceeded. Select highest kV value.**

Check kV setpoint with **'Service routine S.03,' test step 01.**
If out of tolerance (incorrect alignment data in E-PROM):
Perform automatic setpoint alignment with Service Routine **S.03 test step 04**.
Release an exposure. Is error message repeated?

no → The unit is OK again.
Perform Service routine **S.05,** test step **02**.

yes

Filament voltage VH too low.
Perform automatic alignment with **'Service Routine S.05 test step 02**
Release an exposure. Is error message repeated?

no → The unit is OK again.

yes

Check basic level heating with **'Service Routine S.05 test step 03**
Is signal trace OK?

no → Replace the X-ray tube assembly
• 'X-ray tube assembly – action to be taken . . ., ☝ ♦♏♏ □♋♑♏

yes

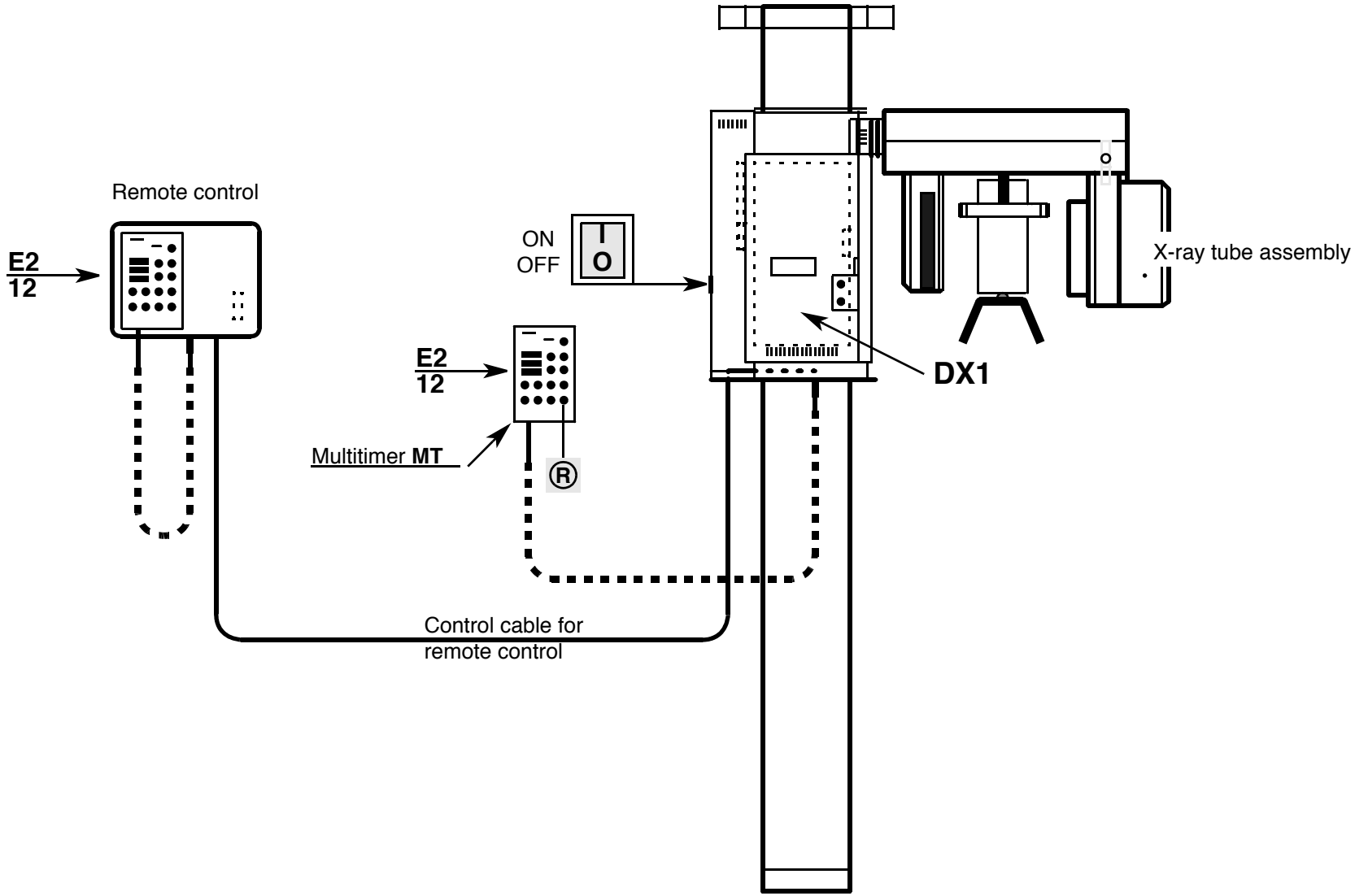
Replace • **Perform 'Adjusting board DX1',** ☝ see page 4 - 31
Release an exposure.
Does the error message repeat?

no → The unit is OK again.

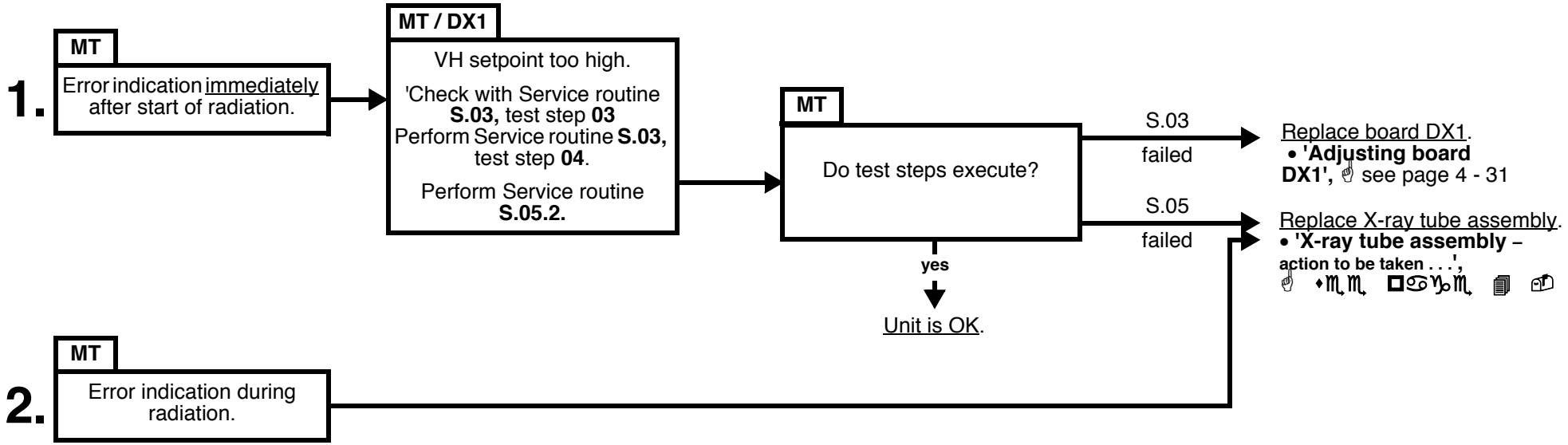
yes

Replace the X-ray tube assembly
• 'X-ray tube assembly – action to be taken . . ., ☝ ♦♏♏ □♋♑♏

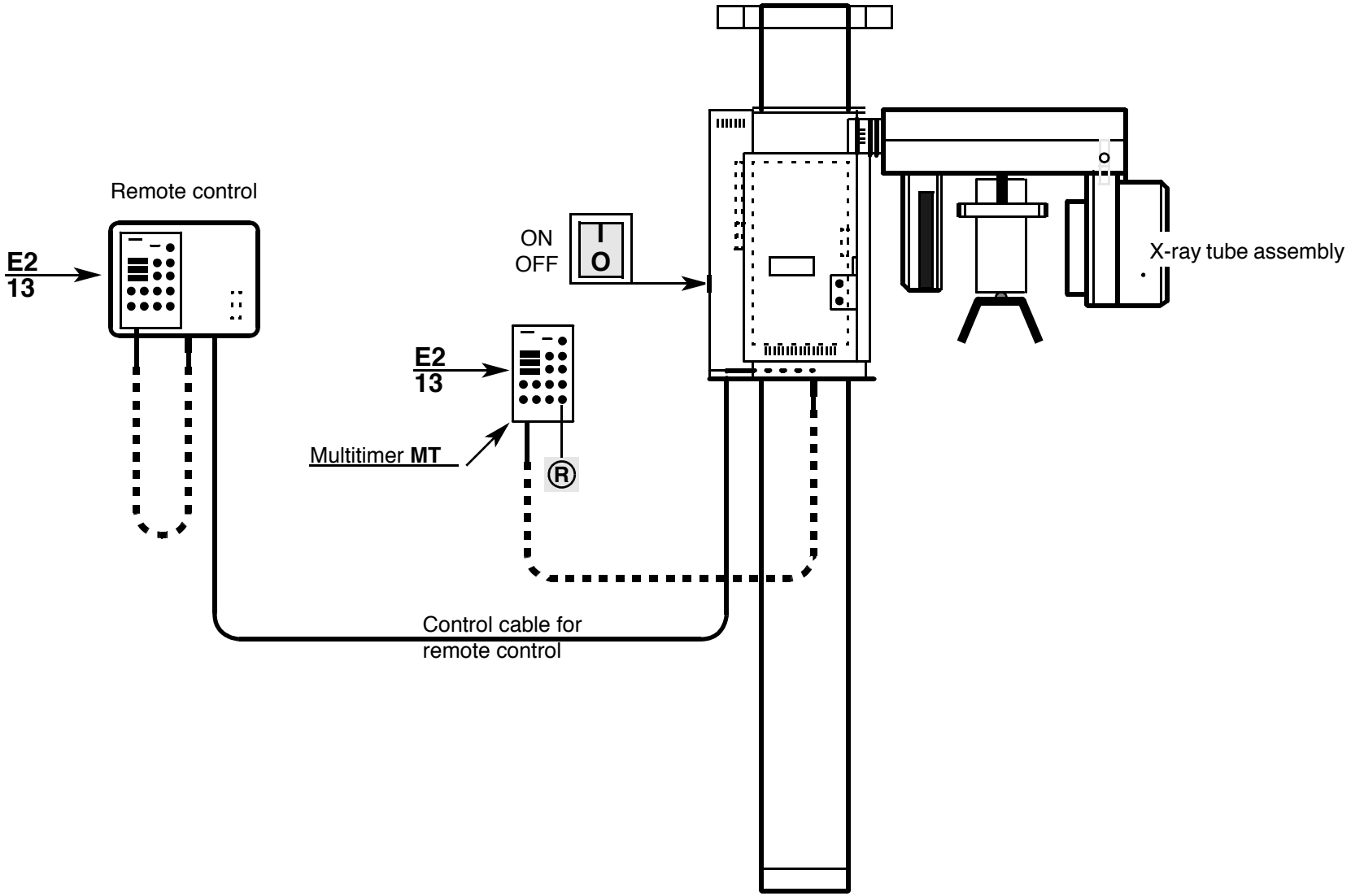
3.10 Correcting error of message E2 11: Anode voltage too high.


Remote control
E2
12
ON
OFF
I
O
X-ray tube assembly
E2
12
DX1
Multitimer MT
R
Control cable for
remote control

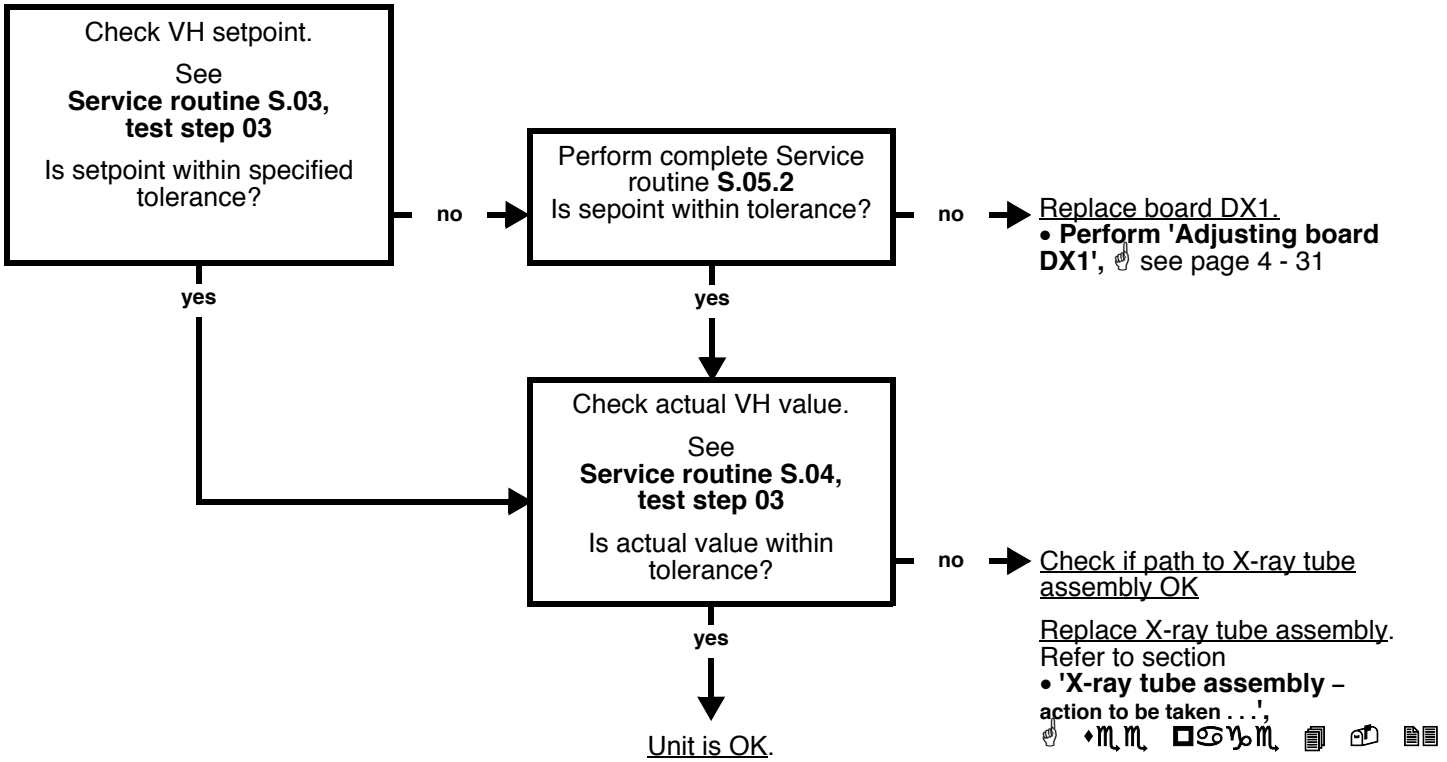
- **Maximum anode current has been exceeded.**



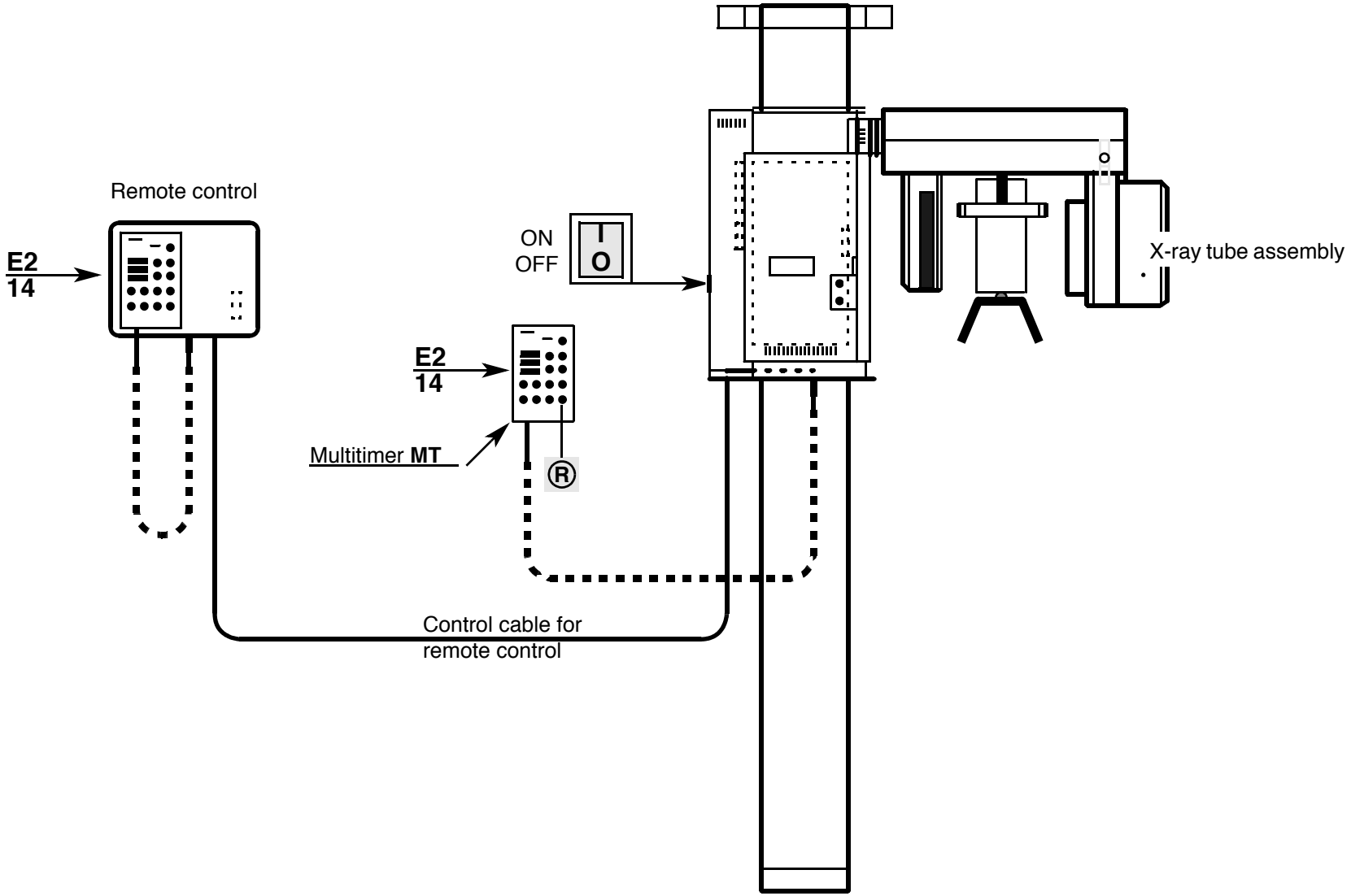
3.11 Correcting error of message E2 12: Anode current too high.


Remote control
E2
13
ON
OFF
I
O
X-ray tube assembly
E2
13
Multitimer MT
R
Control cable for
remote control

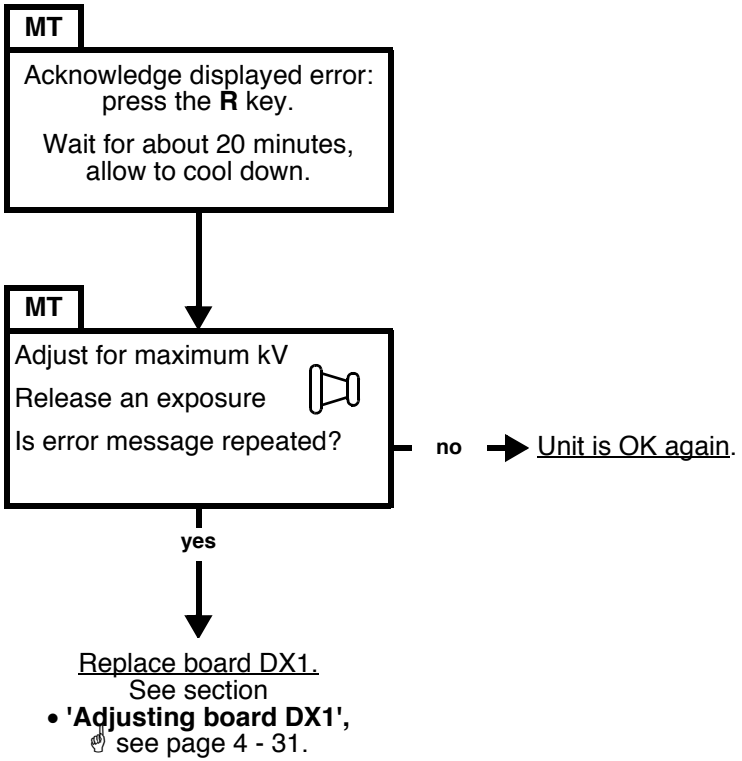
- **Maximum filament voltage VH_{max} has been exceeded.**
- **Check if path from X4 on board DX1 to K3 and on to X-ray tube assembly OK.**



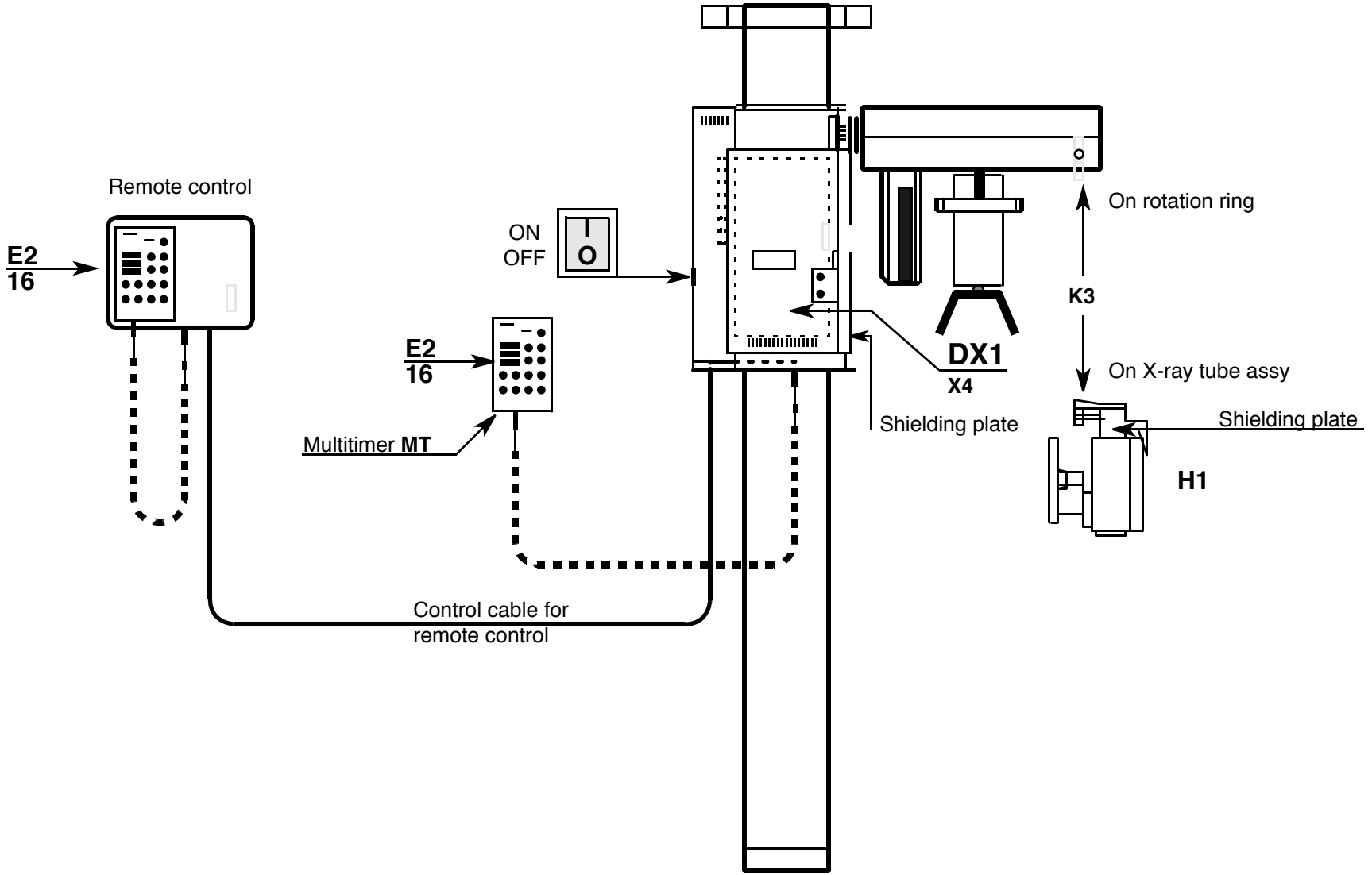
3.12 Correcting error of message E2 13: Filament voltage too high.


Remote control
E2
14
ON
OFF
I
O
X-ray tube assembly
E2
14
Multitimer MT
R
Control cable for
remote control

- **Bridge short-circuit / transistors overheated.**



3.13 Correcting error of message E2 14: Short-circuit in bridge.


Remote control
E2
16
ON
OFF
I
O
E2
16
Multitimer MT
DX1
X4
Shielding plate
On rotation ring
K3
On X-ray tube assy
Shielding plate
H1
Control cable for
remote control

- **Is connector K3 correctly inserted at the X-ray tube assembly?**
- **Locate and repair the cable interruption.**

Check continuity of sections

from DX1 **X4.1** (RD) to **K3.14** on rotation ring,
from **K3.14** (WH) to **H1.R** on X-ray tube assy,
For this purpose remove the X-ray tube assy.

yes

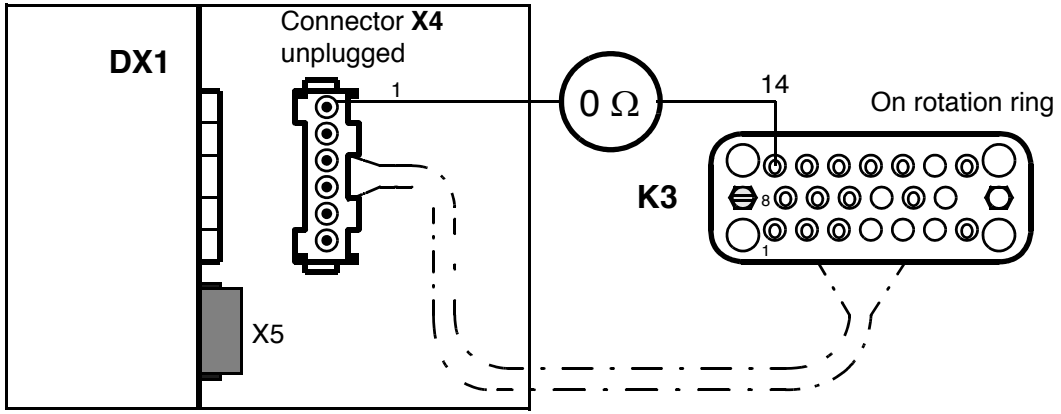
Is there continuity? — **no** → Repair or replace defective cable

yes

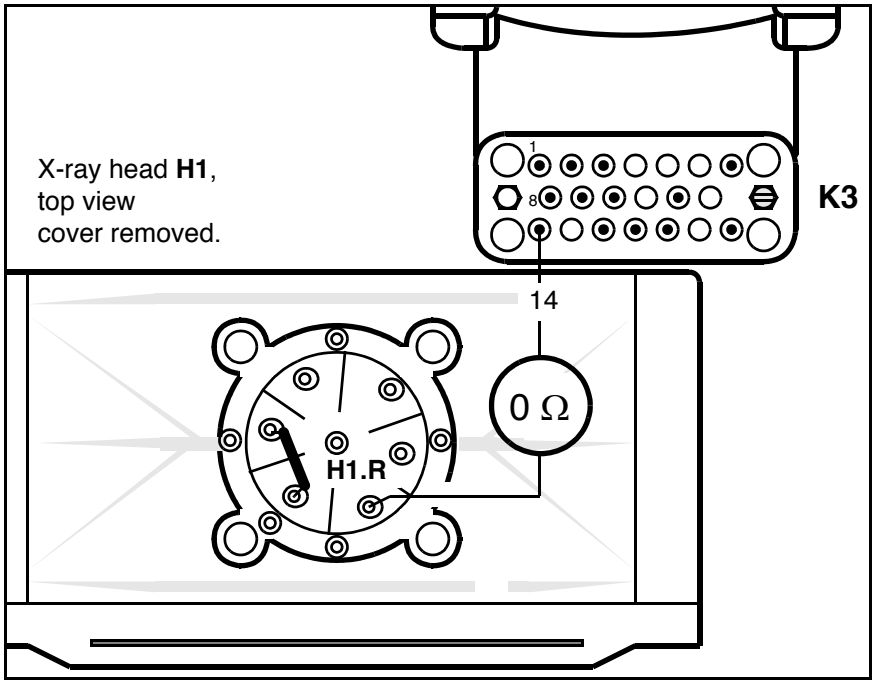
First replace X-ray tube assembly.
Observe section
• **X-ray tube assembly – action to be taken . . .,** ☝

Second replace board DX1.
• Perform **'Adjusting board DX1',** ☝ see page 4 - 31

Replace ring lead last.

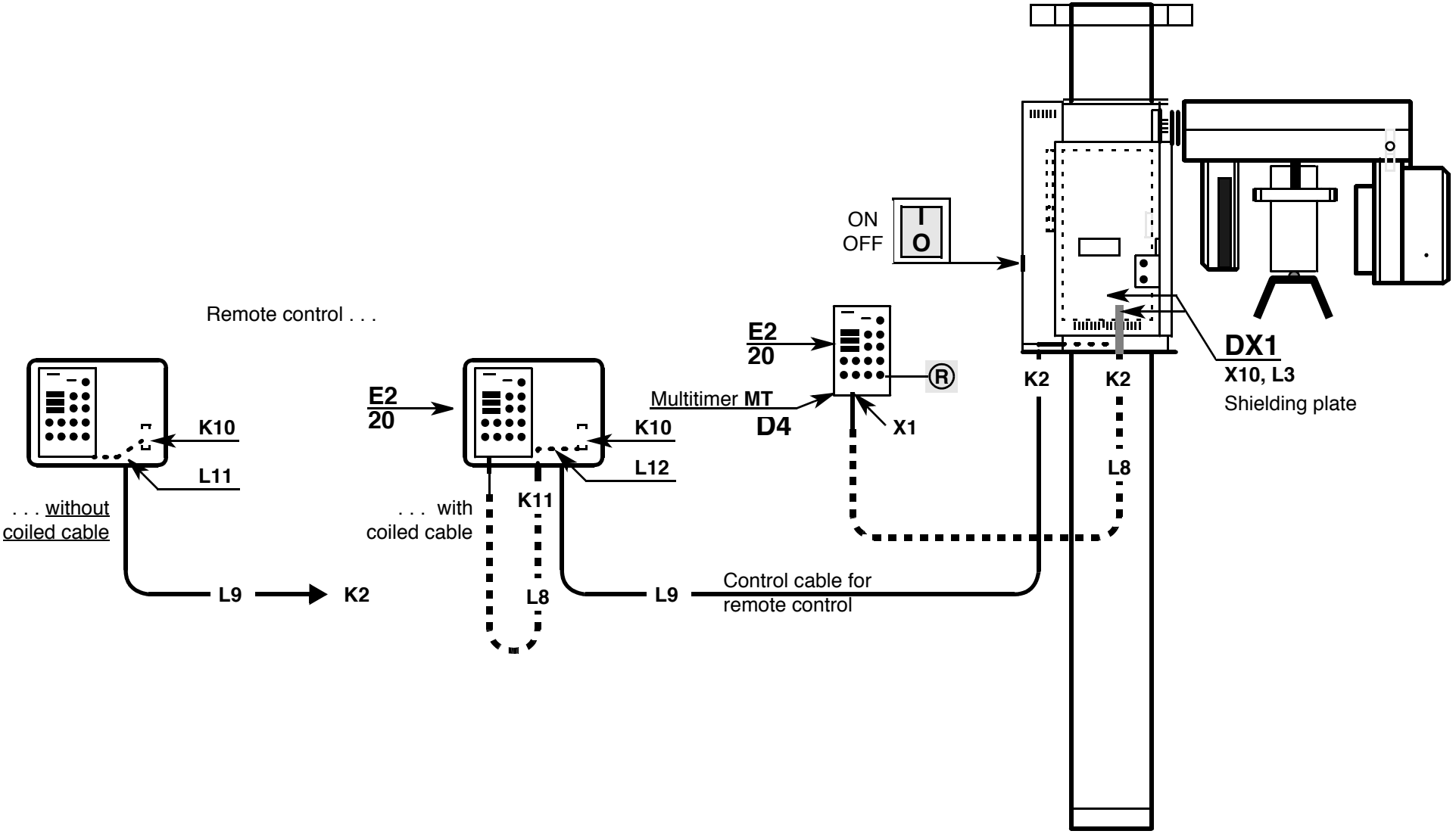


Flange unscrewed and
rotated by 180°



Don't forget the shielding plates during reassembly

3.14 Correcting error of message E2 16: kV_{ACTUAL} – Cable is interrupted.


ON
OFF
I
O
Remote control . . .
E2
20
K10
L11
. . . without
coiled cable
L9
K2
E2
20
K10
L12
K11
. . . with
coiled cable
L8
L9
Multitimer MT
D4
X1
R
Control cable for
remote control
K2
K2
L8
DX1
X10, L3
Shielding plate

- **X-ray room with door contact: Close the door and check proper function of door contact!**

MT

Acknowledge error:
Press the R key.
Release
Does **E2 20** repeat?

no → The unit is OK.

yes

Unit with remote control:

Connect Multitimer directly to unit.

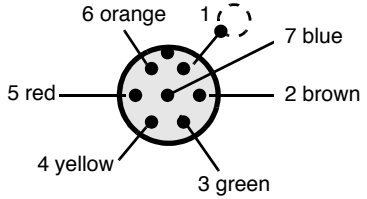
MT

Acknowledge error:
Press the R key.
Release
Does **E2 20** repeat?

no → Cable to remote control is interrupted.
Check continuity of L9 from **K2.4** (yellow) to **K10.3** and of L12 from **K11.4** (yellow) and of L8 to **D4** X1.3B.

→ Repair / replace the lead

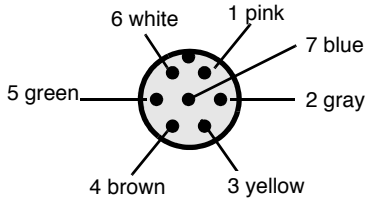
Connector **K2**
(L9) unplugged



yes

Check for correct installation of connector **K2**.

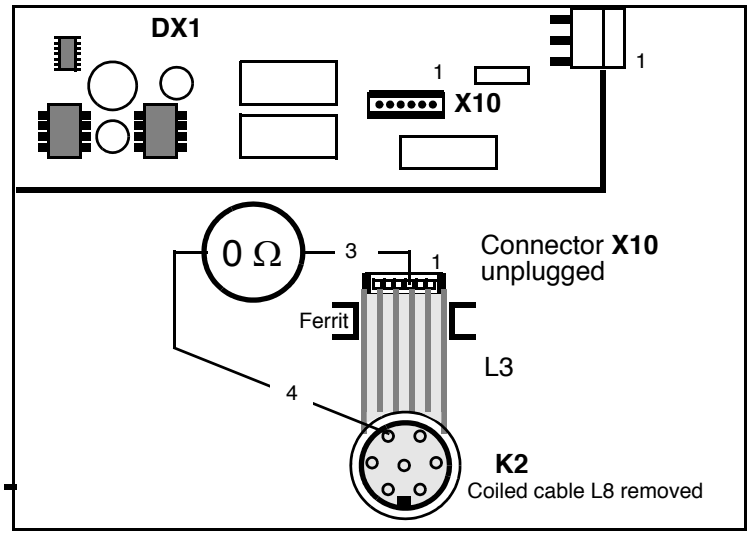
Connectors **K11** (L8)
and **K2** (L8) unplugged



If K2 is OK:

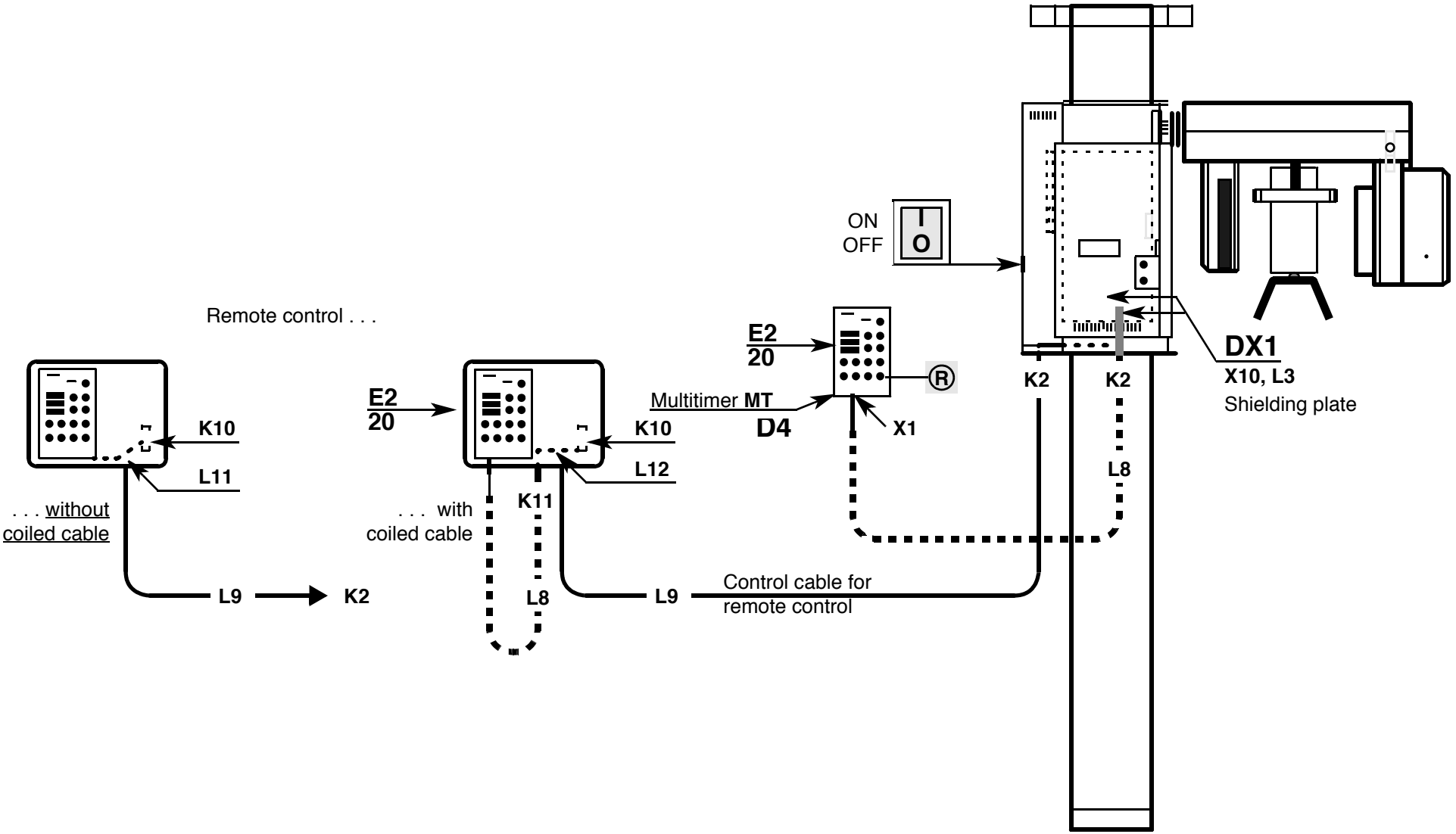
Check continuity of L3 from **DX1** X10.3 to **K2.4**.

Pull connector X10



Continued on next page

3.15 Correcting error of message E2 20: Interrupted exposure lead in Multitimer cable.


ON
OFF
I
O
Remote control . . .
E2
20
E2
20
Multitimer MT
D4
X1
K10
L11
. . . without
coiled cable
K10
L12
K11
. . . with
coiled cable
L9
K2
L8
L9
Control cable for
remote control
K2
K2
L8
DX1
X10, L3
Shielding plate

continued

If L3 is OK:

Check continuity of L8 from **D4** X1.3B to **K2.4**.

Open Multitimer **MT**
Pull connector X1

If L8 is OK:

Replace the Multitimer

MT

Release an exposure.

Does **E2 20** repeat?

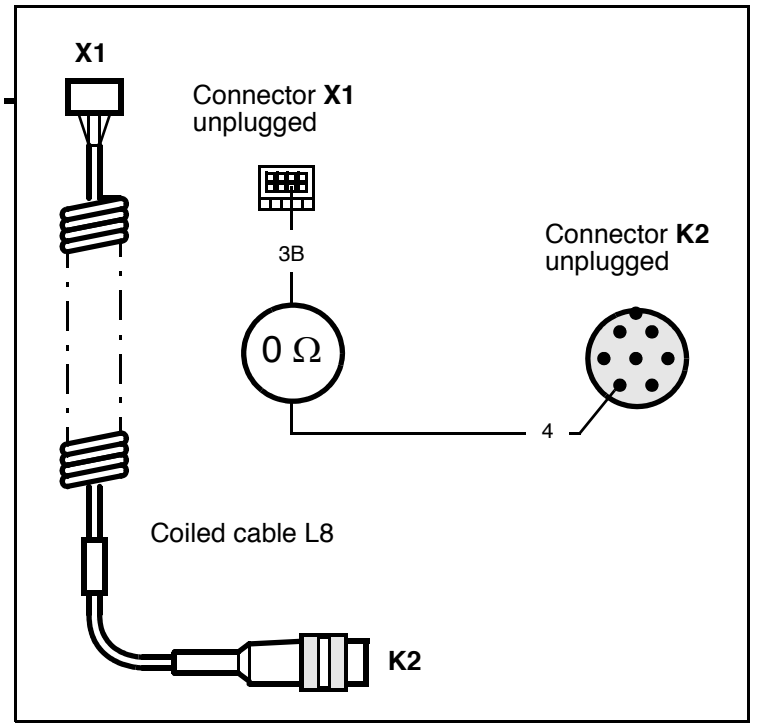
no → Unit is OK.

yes

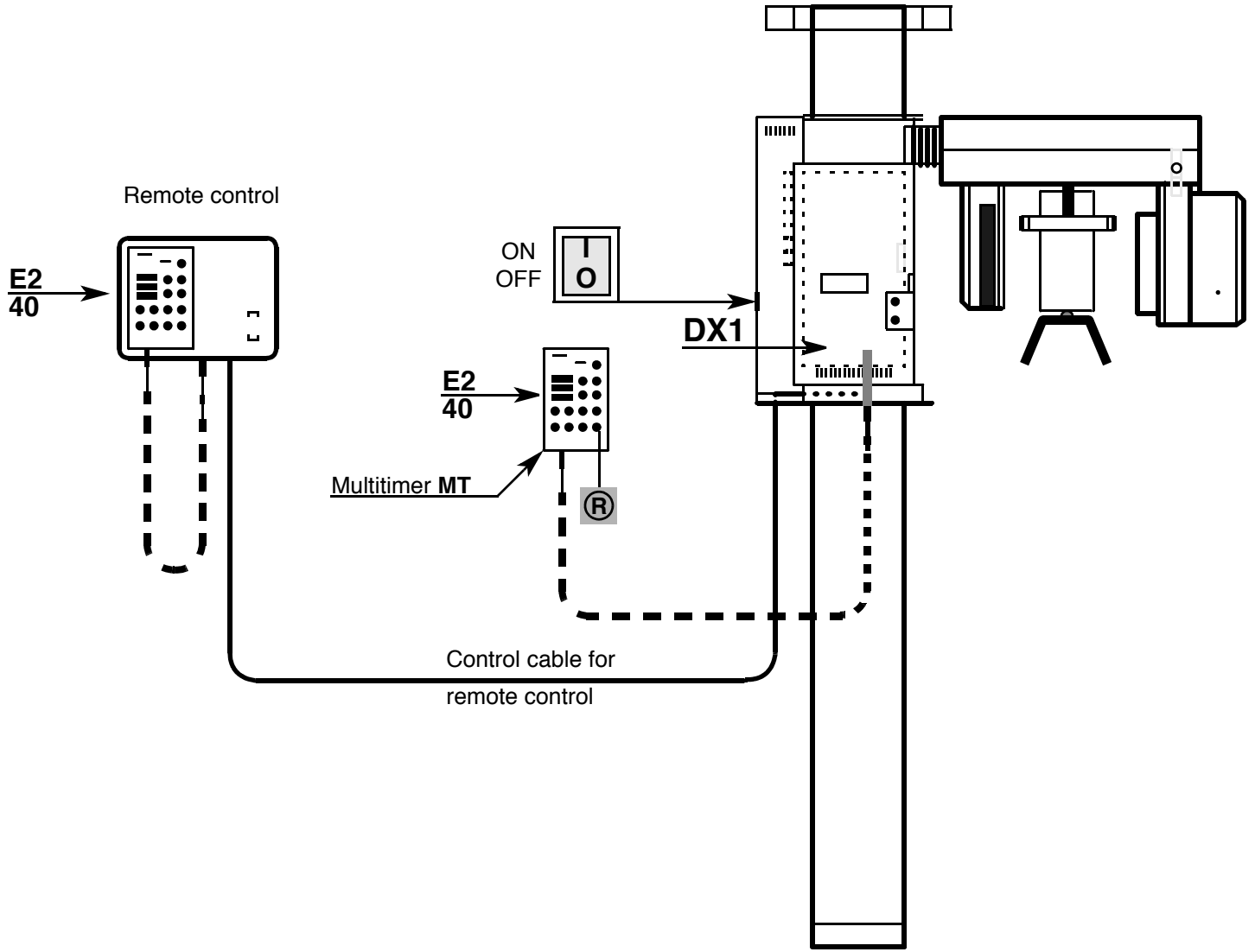
Replace board DX1

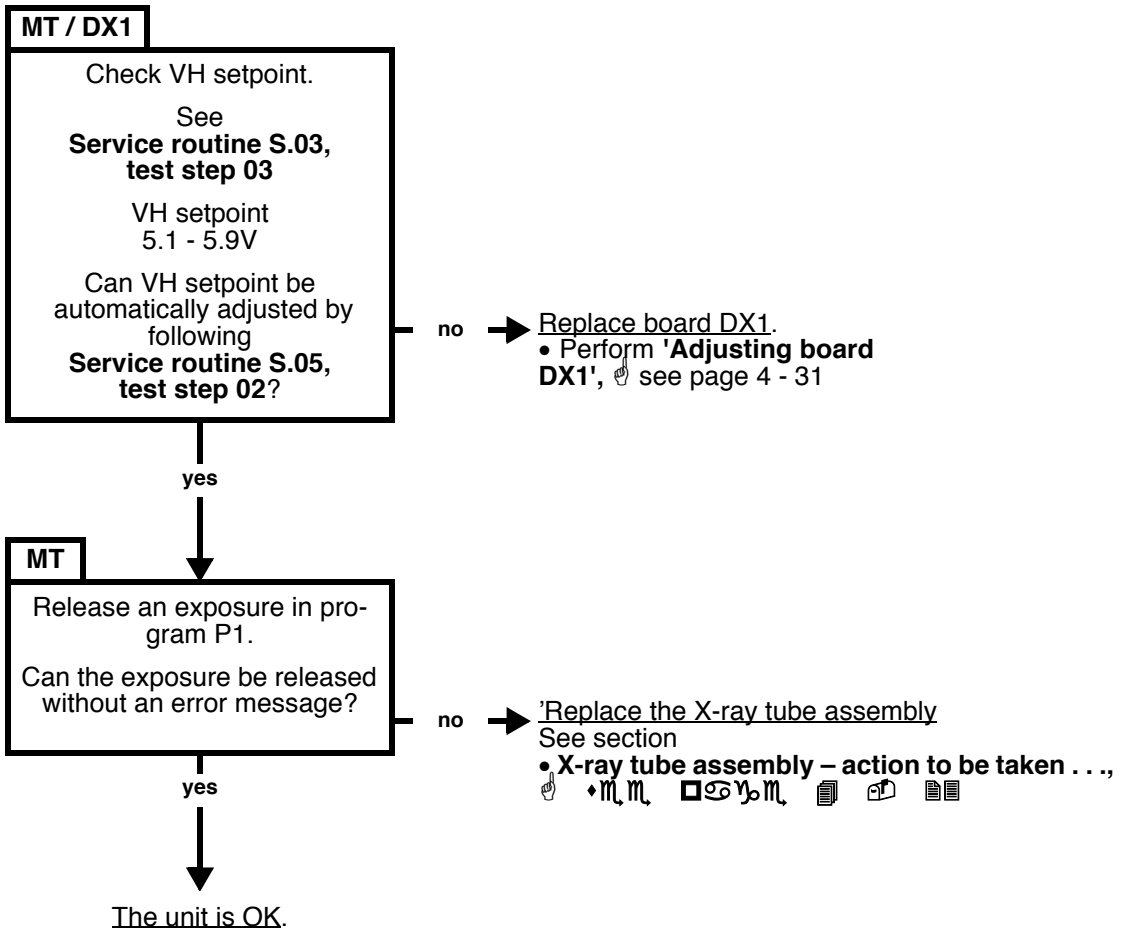
- Perform **'Adjusting board DX1'**, see page 4 - 31

The Multitimer just replaced is OK.

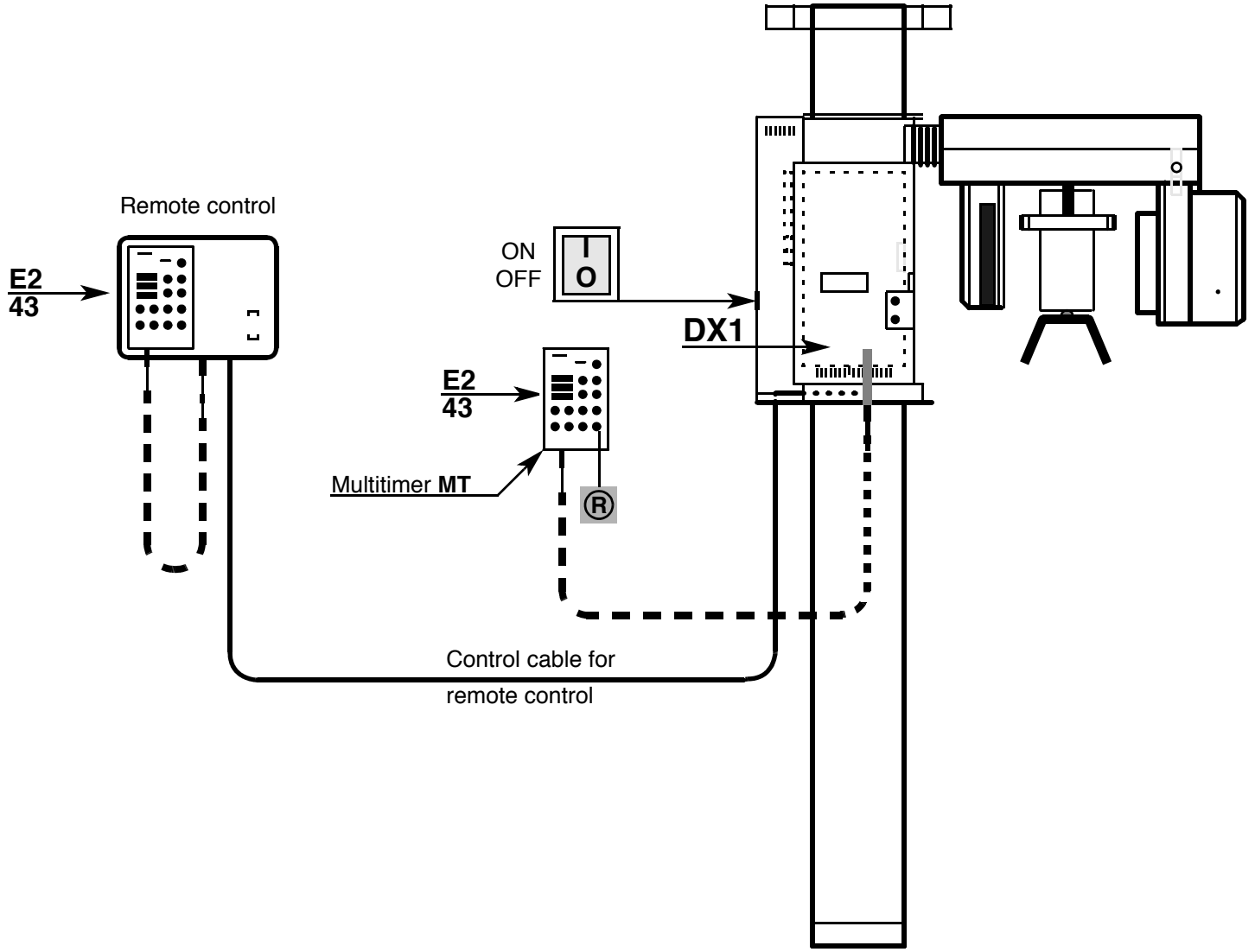


3.15 Correcting error of message E2 20: Exposure lead in Multitimer cable interrupted.

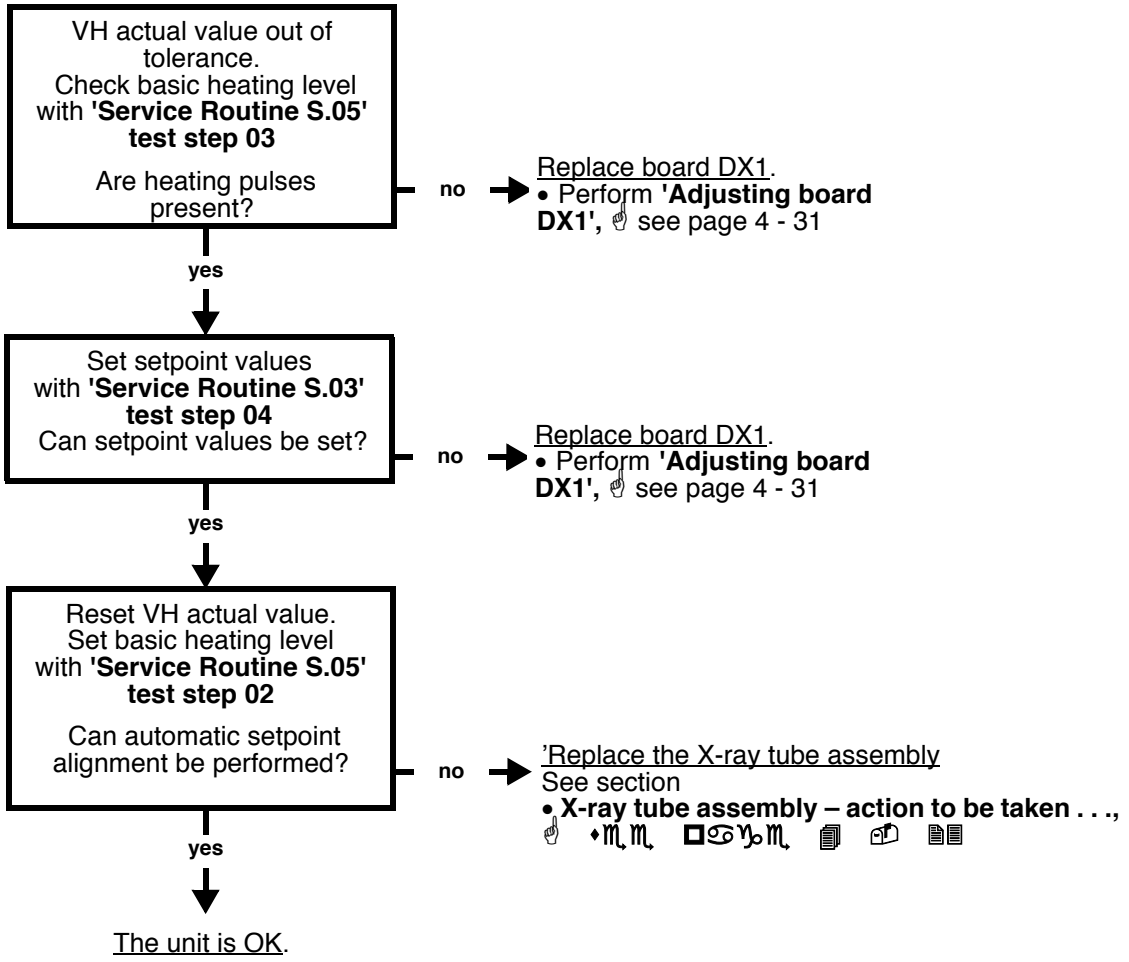

Remote control
E2
40
ON
OFF
I
O
DX1
E2
40
Multitimer MT
®
Control cable for
remote control


MT / DX1
Check VH setpoint.
See
Service routine S.03, test step 03
VH setpoint
5.1 - 5.9V
Can VH setpoint be automatically adjusted by following
Service routine S.05, test step 02?
no
Replace board DX1.
• Perform 'Adjusting board DX1', see page 4 - 31
yes
MT
Release an exposure in program P1.
Can the exposure be released without an error message?
no
'Replace the X-ray tube assembly
See section
• X-ray tube assembly – action to be taken . . .,
yes
The unit is OK.

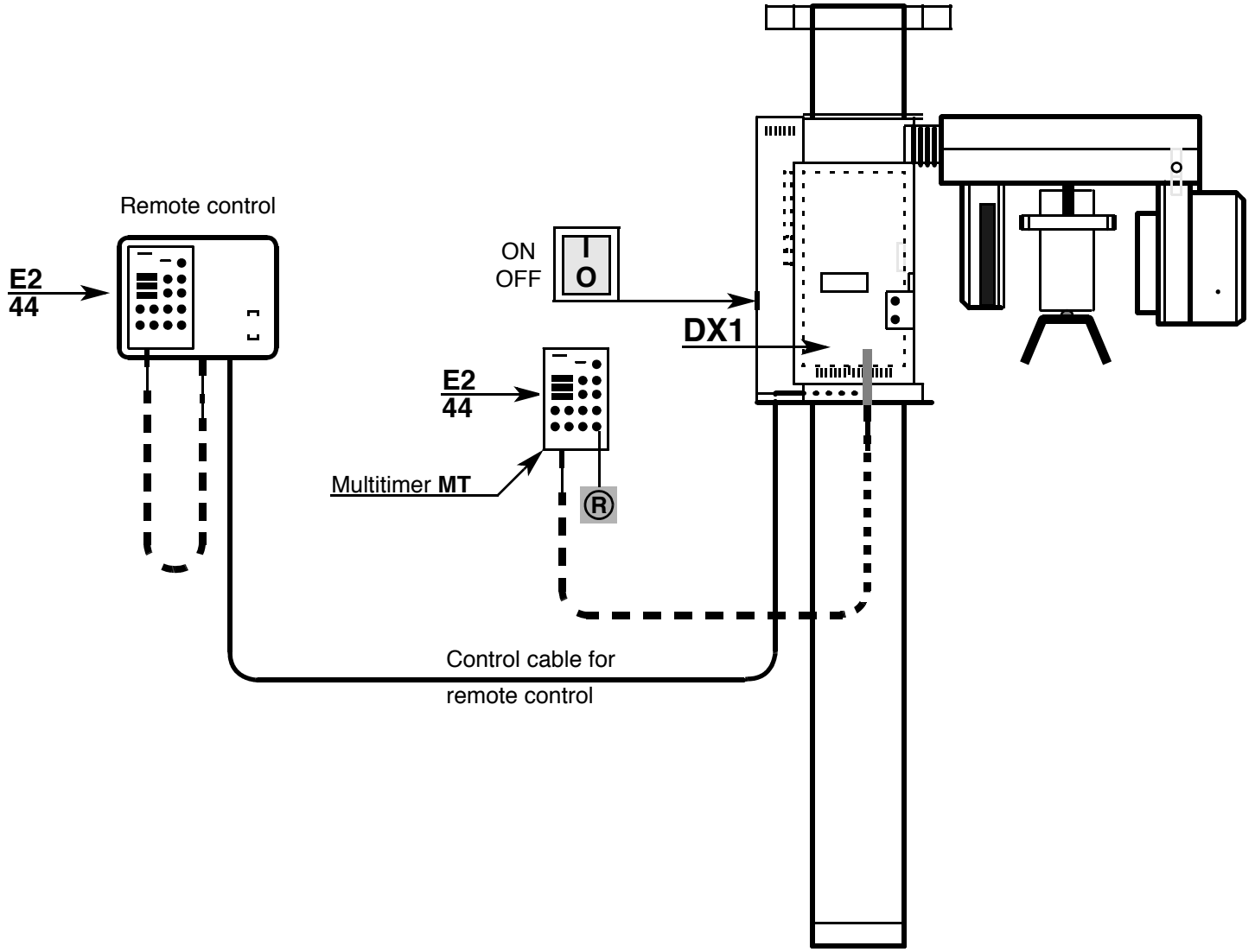
3.16 Correcting error of message E2 40: VH setpoint out of tolerance.


Remote control
E2
43
ON
OFF
I
O
DX1
E2
43
Multitimer MT
®
Control cable for
remote control

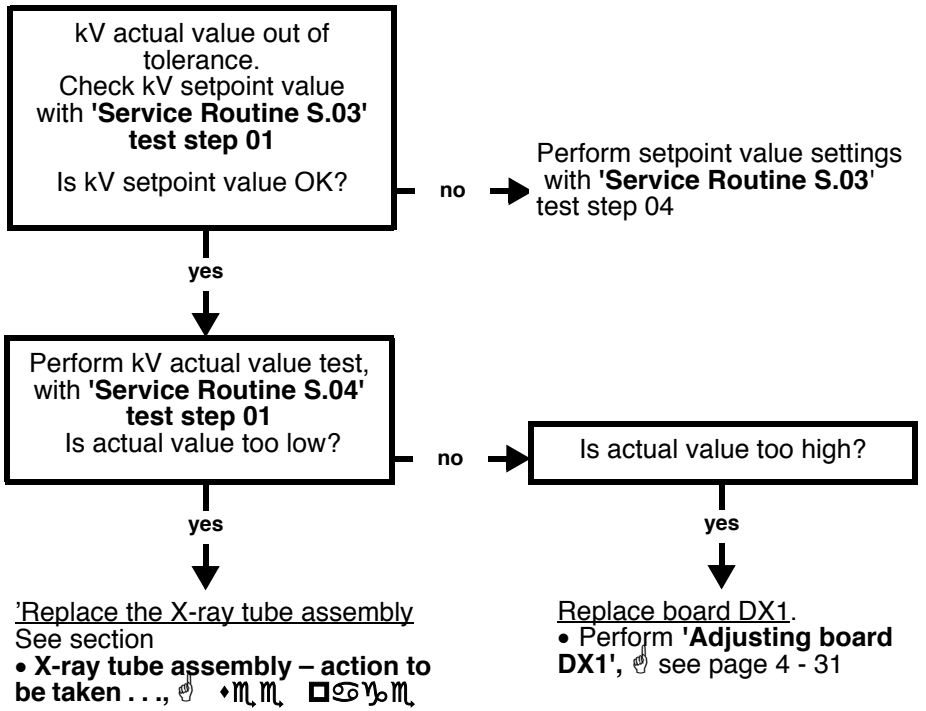
- **Fuse on DX3 OK.? Plug connections from L4 OK? LEDs on DX3 lit up?**


VH actual value out of tolerance.
Check basic heating level with **'Service Routine S.05' test step 03**
Are heating pulses present?
no
Replace board DX1.
• Perform **'Adjusting board DX1',** see page 4 - 31
yes
Set setpoint values with **'Service Routine S.03' test step 04**
Can setpoint values be set?
no
Replace board DX1.
• Perform **'Adjusting board DX1',** see page 4 - 31
yes
Reset VH actual value.
Set basic heating level with **'Service Routine S.05' test step 02**
Can automatic setpoint alignment be performed?
no
'Replace the X-ray tube assembly
See section
• **X-ray tube assembly – action to be taken . . .,**
yes
The unit is OK.

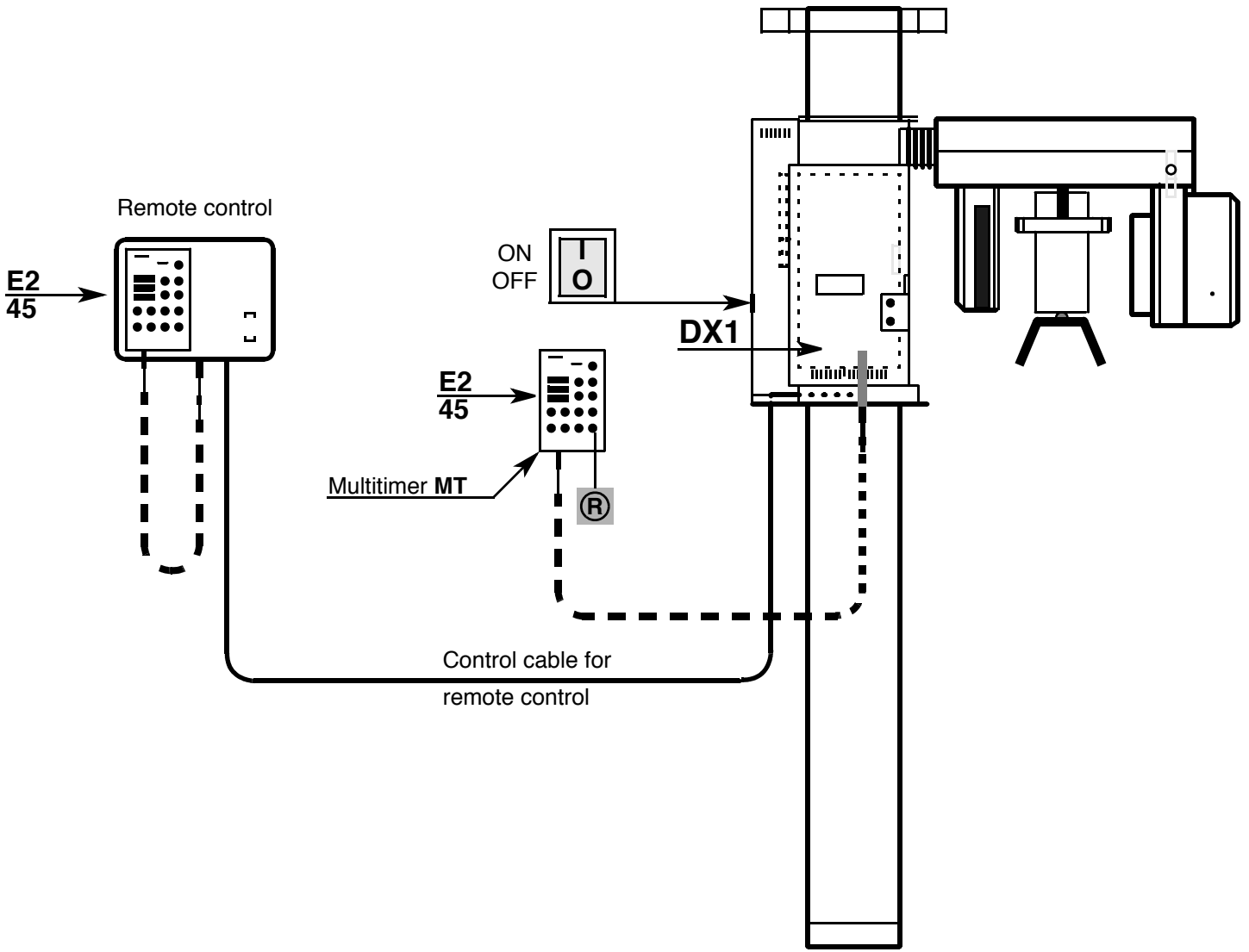
3.17 Correcting error of message E2 43: VH setpoint out of tolerance.

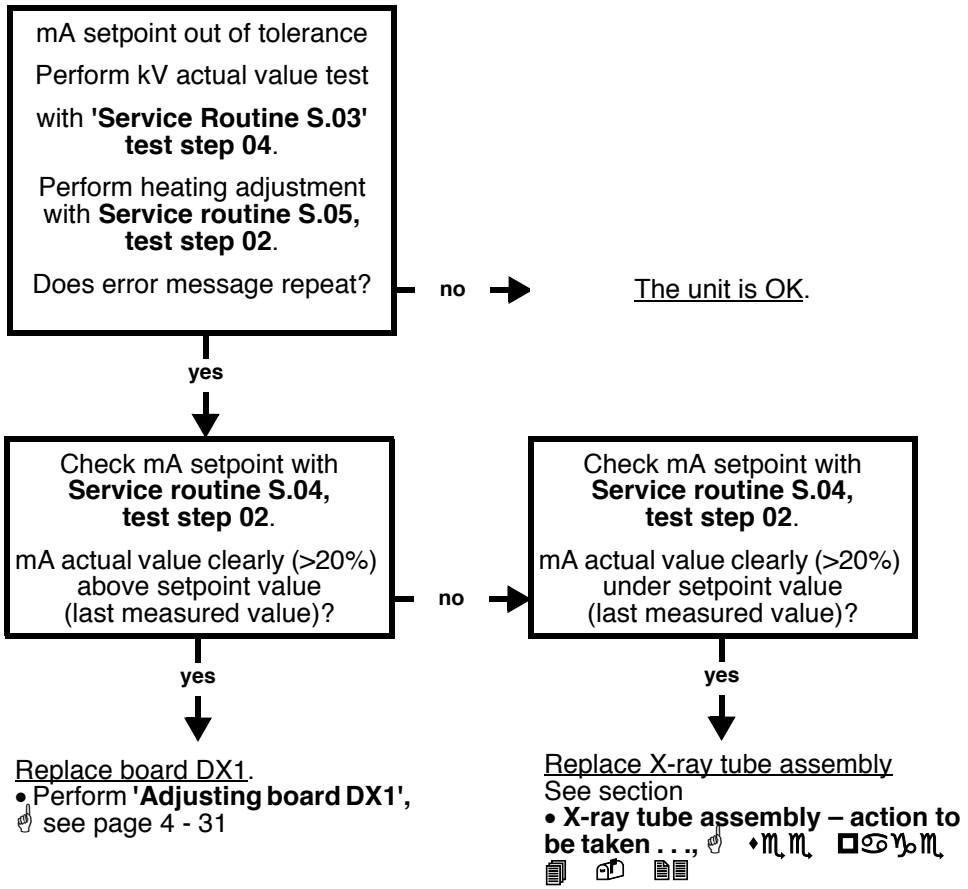

Remote control
E2
44
ON
OFF
I
O
DX1
E2
44
Multitimer MT
®
Control cable for
remote control

- **Plug connections from L4 OK?**

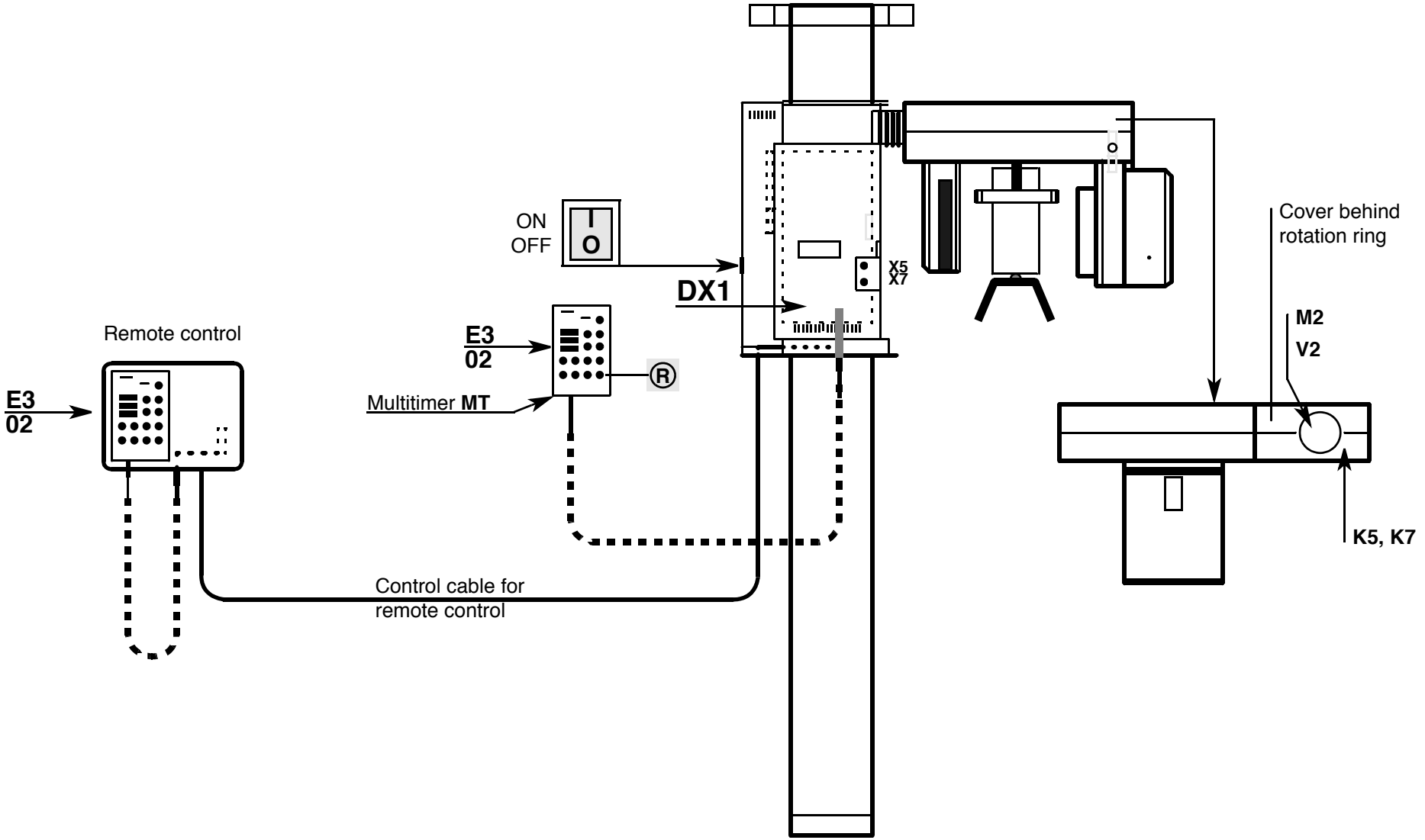

kV actual value out of tolerance.
Check kV setpoint value with **'Service Routine S.03' test step 01**
Is kV setpoint value OK?
no
Perform setpoint value settings with **'Service Routine S.03**' test step 04
yes
Perform kV actual value test, with **'Service Routine S.04' test step 01**
Is actual value too low?
no
Is actual value too high?
yes
yes
'Replace the X-ray tube assembly
See section
• **X-ray tube assembly – action to be taken . . .,** ☝ ♦♏♏ ◘♋♑♏
Replace board DX1.
• Perform **'Adjusting board DX1',** ☝ see page 4 - 31

3.18 Correcting error of message E2 44: kV setpoint out of tolerance.

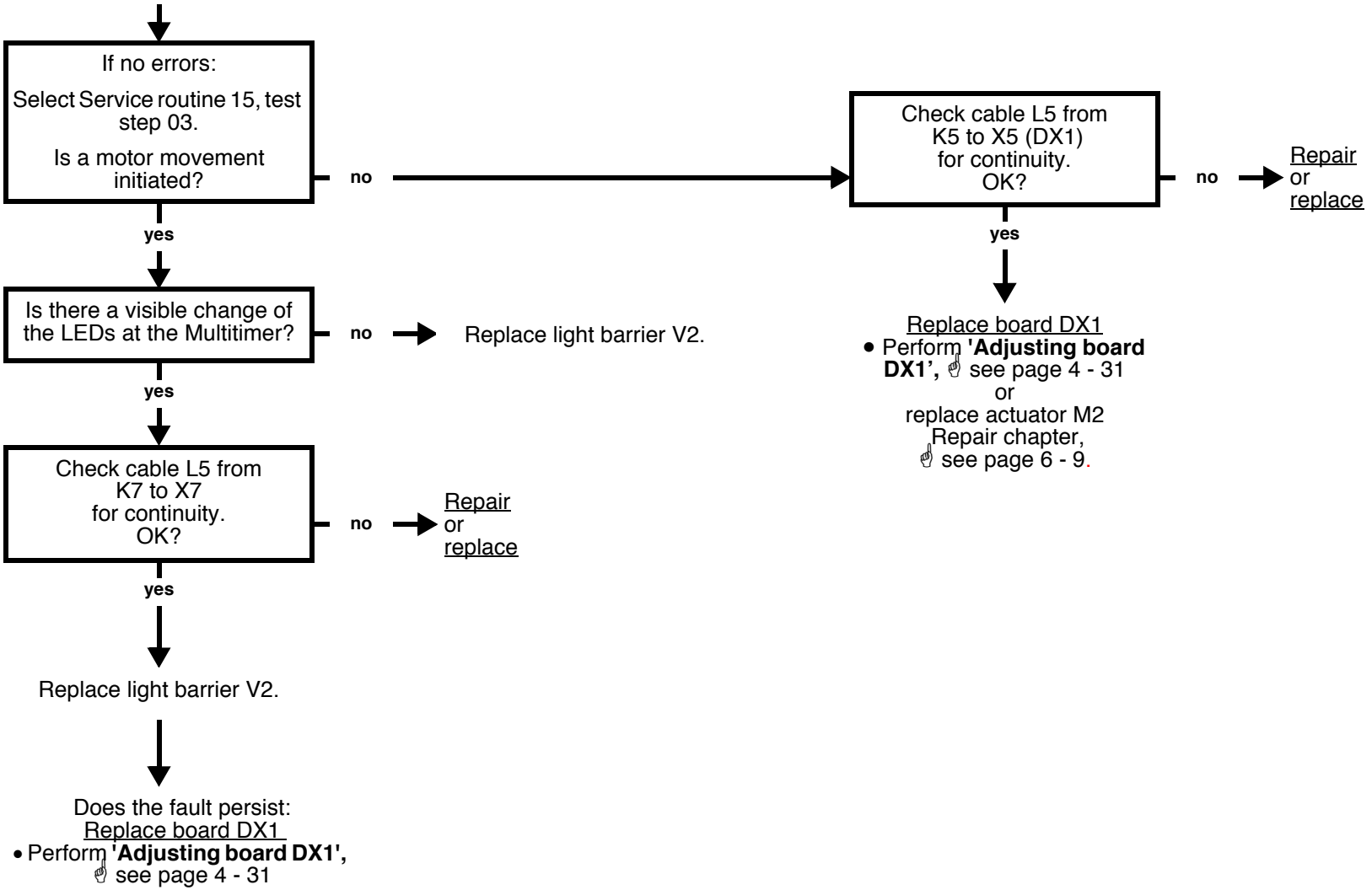

Remote control
E2
45
ON
OFF
I
O
DX1
E2
45
Multitimer MT
®
Control cable for
remote control


mA setpoint out of tolerance
Perform kV actual value test
with **'Service Routine S.03' test step 04**.
Perform heating adjustment with **Service routine S.05, test step 02**.
Does error message repeat?
no
The unit is OK.
yes
Check mA setpoint with **Service routine S.04, test step 02**.
mA actual value clearly (>20%) above setpoint value (last measured value)?
no
Check mA setpoint with **Service routine S.04, test step 02**.
mA actual value clearly (>20%) under setpoint value (last measured value)?
yes
yes
Replace board DX1.
• Perform **'Adjusting board DX1',**
see page 4 - 31
Replace X-ray tube assembly
See section
• **X-ray tube assembly – action to be taken . . .,**

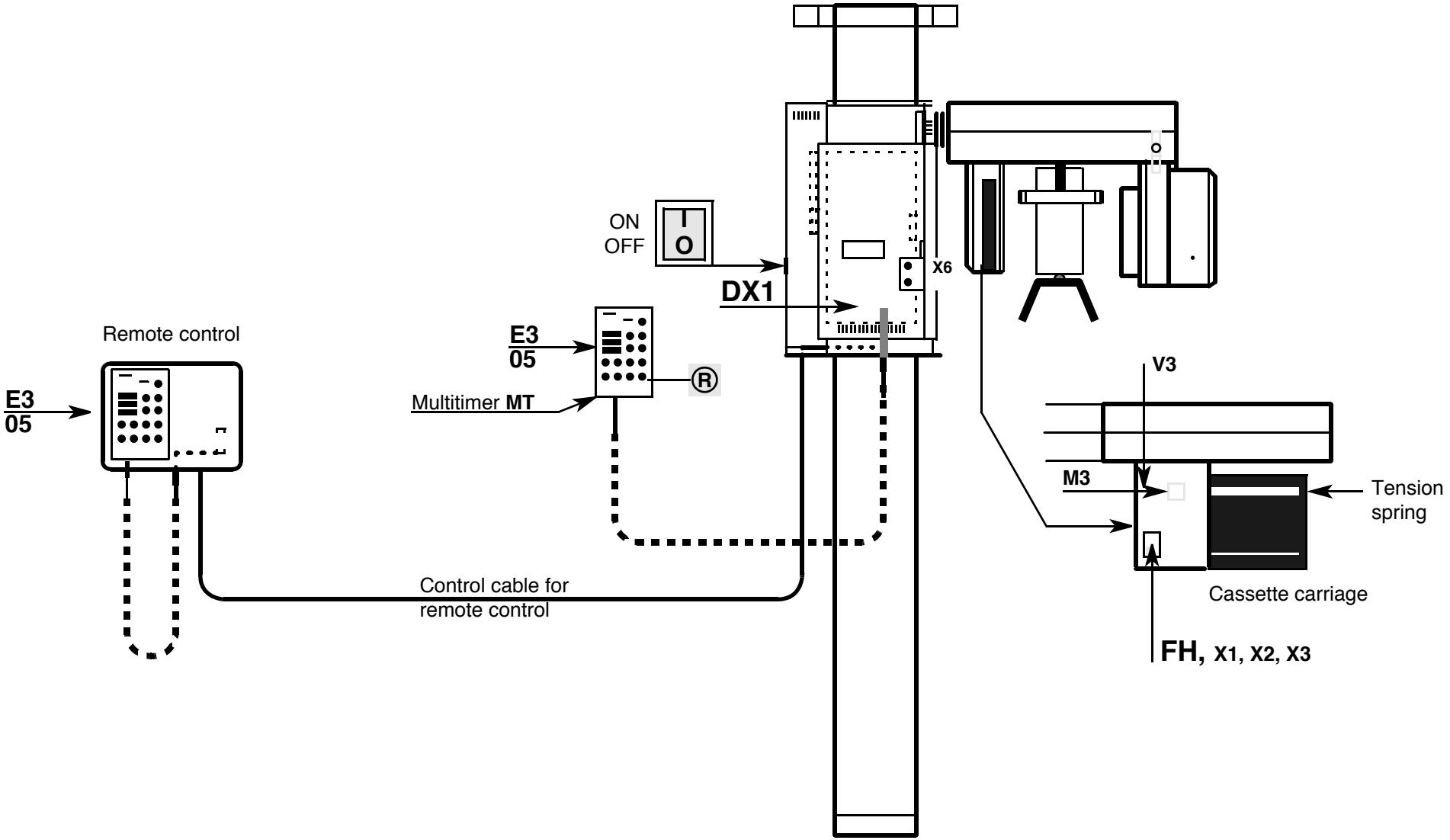
3.19 Correcting error of message E2 45: mA setpoint out of tolerance.


ON
OFF
I
O
DX1
X5
X7
Cover behind
rotation ring
M2
V2
K5, K7
Remote control
E3
02
E3
02
Multitimer MT
R
Control cable for
remote control

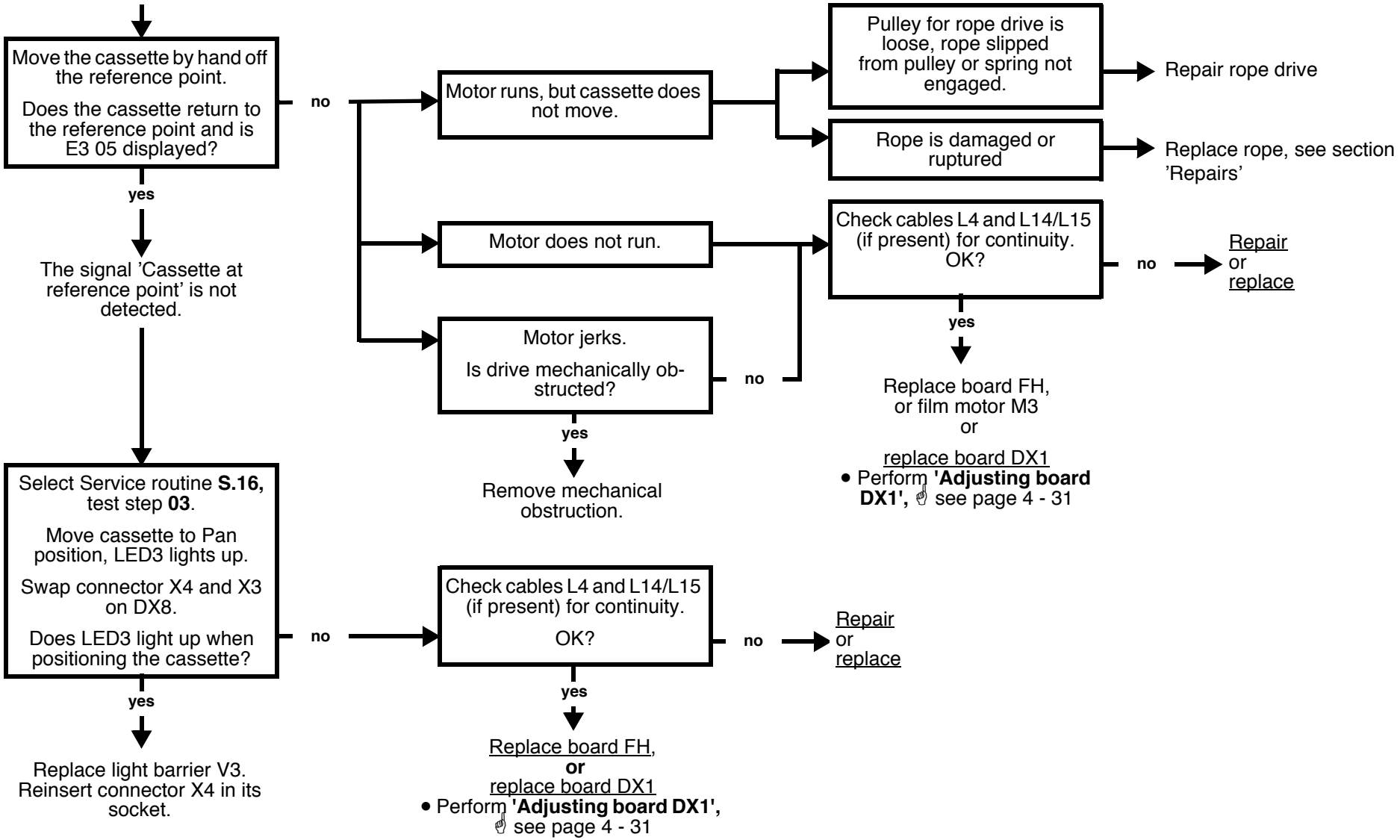
- **Is seating of plug connectors K5 (M2) and K7 (V2) and of plugs X5 and X7 on board DX1 OK?**
- **Are supply voltages present on DX1? → LEDs V10-14 on DX3 must light up!**


If no errors:
Select Service routine 15, test step 03.
Is a motor movement initiated?
no
Check cable L5 from K5 to X5 (DX1) for continuity. OK?
no
Repair or replace
yes
yes
Replace board DX1
• Perform 'Adjusting board DX1', see page 4 - 31
or
replace actuator M2
Repair chapter,
see page 6 - 9.
Is there a visible change of the LEDs at the Multitimer?
no
Replace light barrier V2.
yes
Check cable L5 from K7 to X7 for continuity. OK?
no
Repair or replace
yes
Replace light barrier V2.
Does the fault persist:
Replace board DX1
• Perform 'Adjusting board DX1', see page 4 - 31

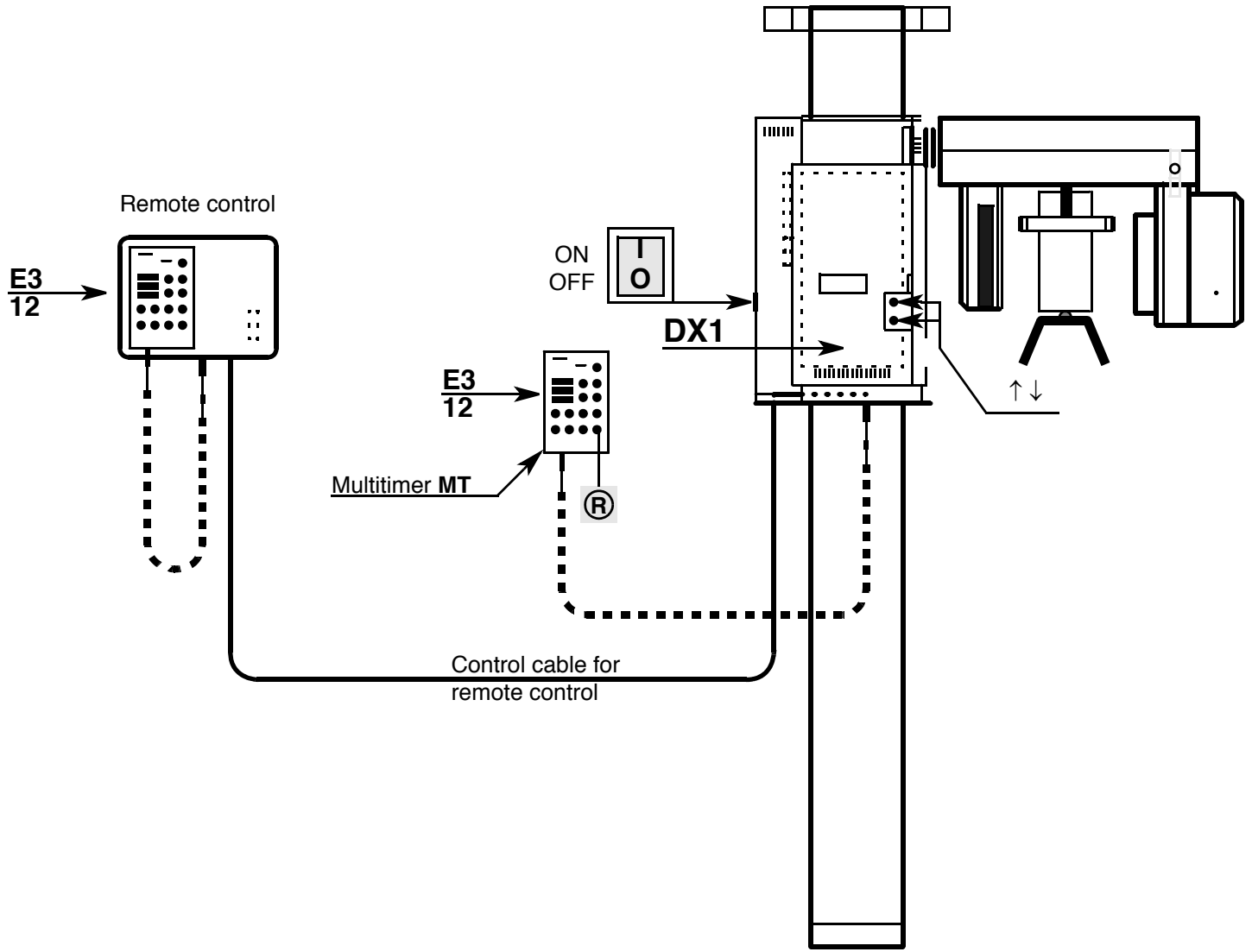
3.20 Correcting error of messages E3 01, E3 02: Actuator M2 has not left/reached the tripping position.


ON
OFF
I
O
DX1
X6
E3
05
Remote control
E3
05
Multitimer MT
R
V3
M3
Tension
spring
Control cable for
remote control
Cassette carriage
FH, X1, X2, X3

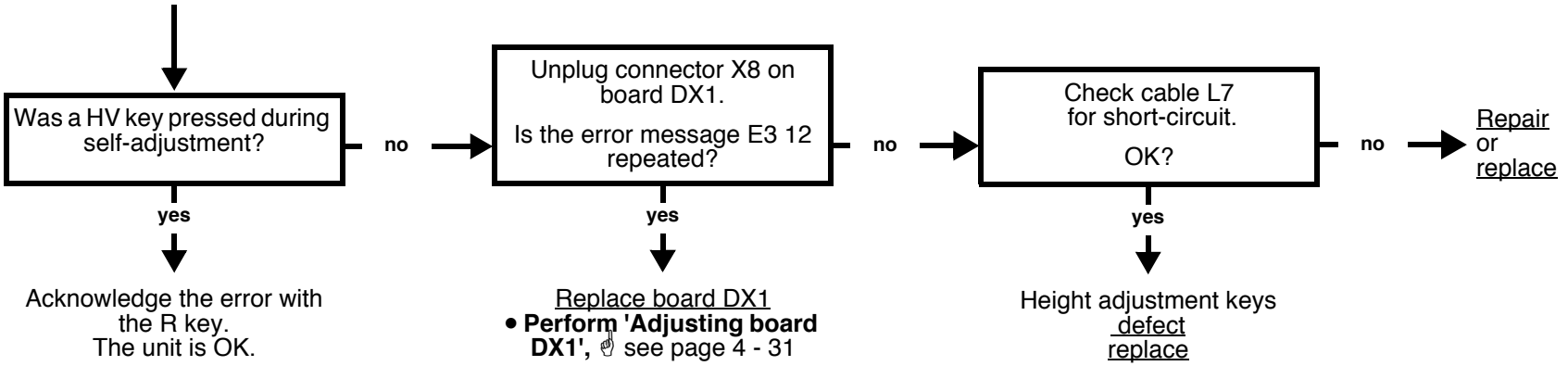
- **Cassette holder must be set for Pan mode, service routine must not be selected, no help message or error message must be displayed.**


Move the cassette by hand off the reference point.
Does the cassette return to the reference point and is E3 05 displayed?
no
yes
The signal 'Cassette at reference point' is not detected.
Select Service routine **S.16,** test step **03**.
Move cassette to Pan position, LED3 lights up.
Swap connector X4 and X3 on DX8.
Does LED3 light up when positioning the cassette?
no
yes
Replace light barrier V3. Reinsert connector X4 in its socket.
Motor runs, but cassette does not move.
Pulley for rope drive is loose, rope slipped from pulley or spring not engaged.
Repair rope drive
Rope is damaged or ruptured
Replace rope, see section 'Repairs'
Motor does not run.
Check cables L4 and L14/L15 (if present) for continuity. OK?
no
Repair or replace
yes
Replace board FH, or film motor M3 or replace board DX1
• Perform **'Adjusting board DX1',** see page 4 - 31
Motor jerks.
Is drive mechanically obstructed?
no
yes
Remove mechanical obstruction.
Check cables L4 and L14/L15 (if present) for continuity.
OK?
no
Repair or replace
yes
Replace board FH, **or** replace board DX1
• Perform **'Adjusting board DX1',** see page 4 - 31

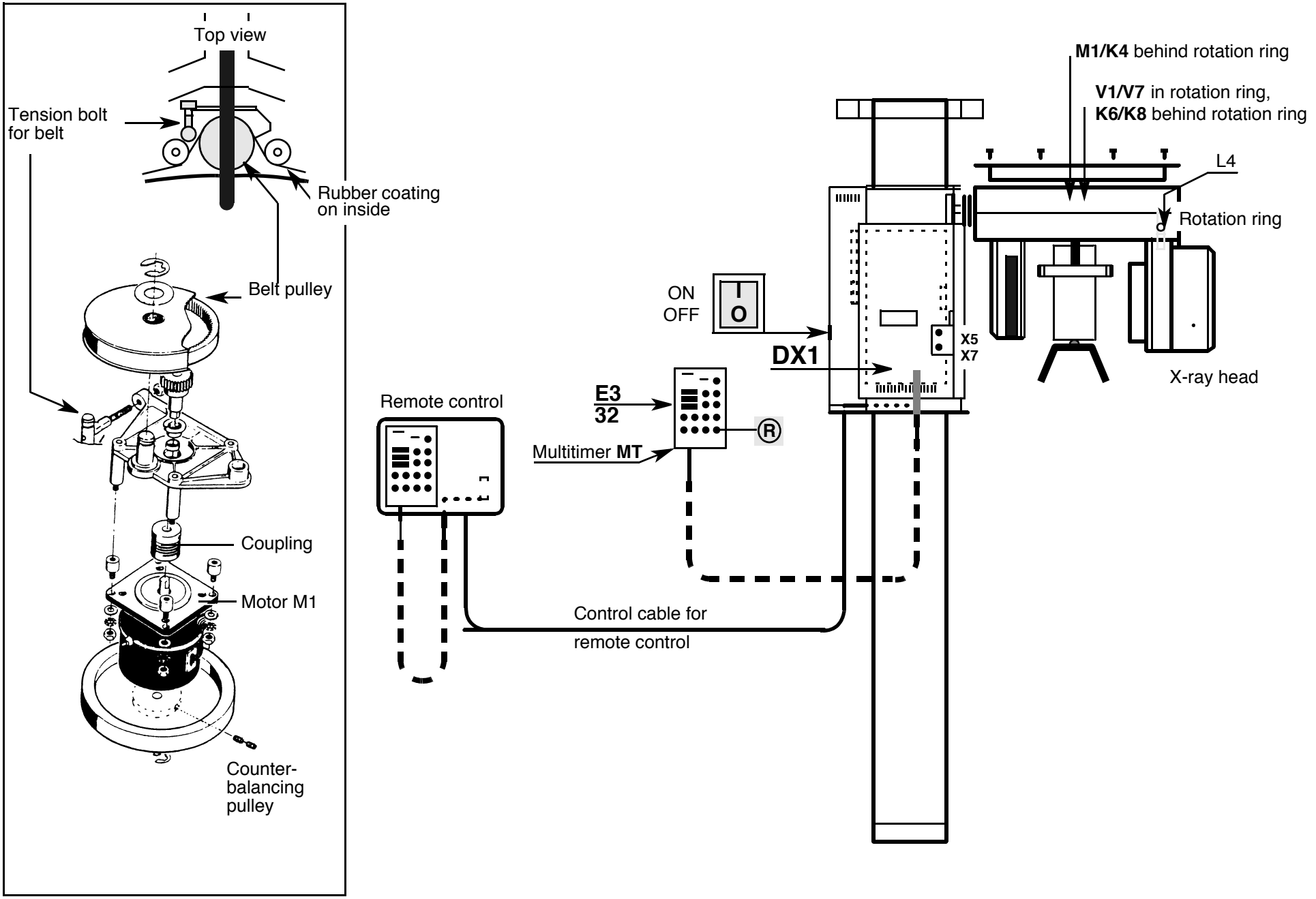
3.21 Correcting error of messages E3 05, E3 06: Cassette carriage has not left/reached the reference point.


Remote control
E3
12
ON
OFF
I
O
DX1
E3
12
Multitimer MT
R
Control cable for
remote control

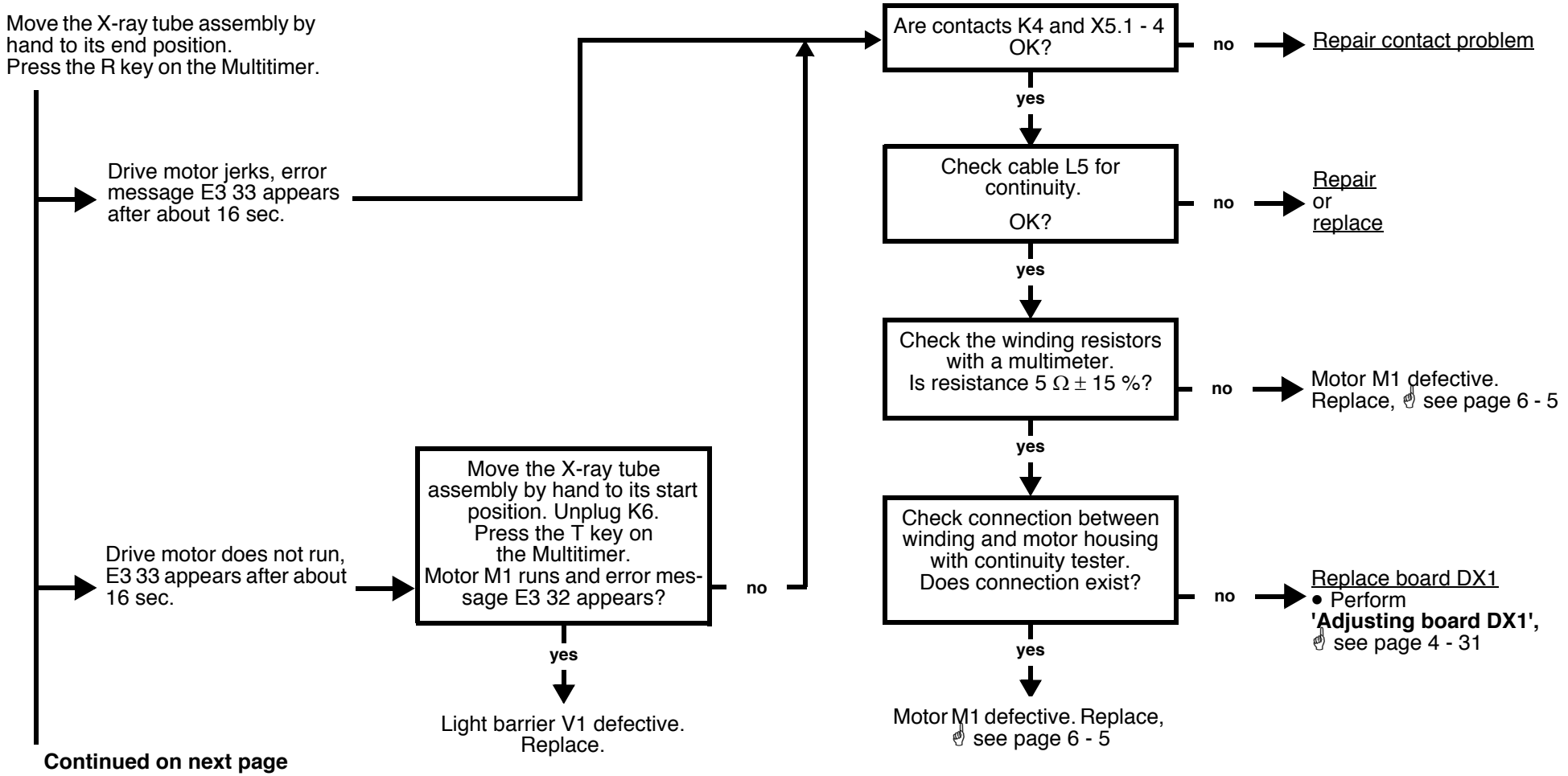
- **Height adjustment keys must not be pressed during self-adjustment of the unit!**



3.22 Correcting error of message E3 12: Key for height adjustment pressed during unit self-adjustment.

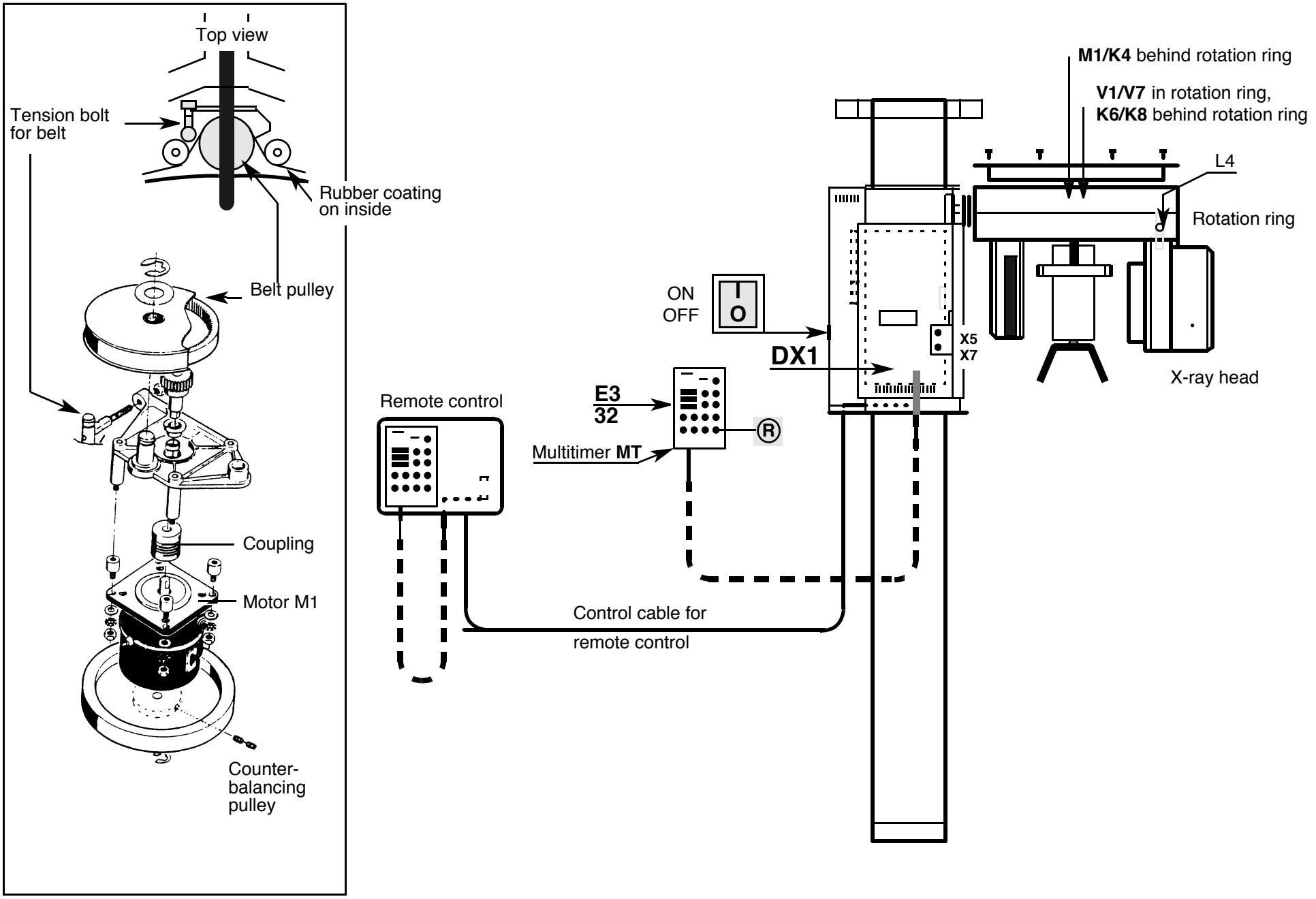

Top view
Tension bolt for belt
Rubber coating on inside
Belt pulley
Coupling
Motor M1
Counter-balancing pulley
M1/K4 behind rotation ring
V1/V7 in rotation ring,
K6/K8 behind rotation ring
L4
Rotation ring
X-ray head
ON
OFF
I
O
DX1
X5
X7
Remote control
E3
32
Multitimer MT
R
Control cable for
remote control

- **Check rotation ring for possible mechanical faults: move the X-ray tube assy by hand over the entire rotation range. X-ray tube assy must move smoothly without grinding noise**
- **Possible faults: weight compensation disk on motor M1, rooting of cable L4 in rotation ring, cable ties, covers.**
- **Possible electrical faults: connectors X5 and X7 on DX1 must be properly inserted**
- **Do supply voltages reach DX1? → LEDs V10-14 on DX3 must light up!**

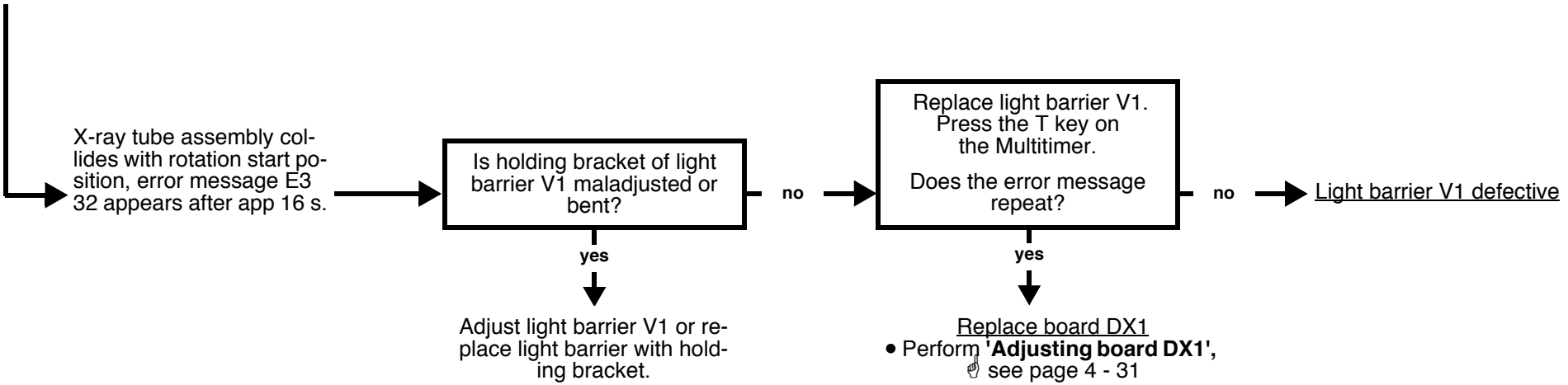

Move the X-ray tube assembly by hand to its end position.
Press the R key on the Multitimer.
Drive motor jerks, error message E3 33 appears after about 16 sec.
Drive motor does not run, E3 33 appears after about 16 sec.
Move the X-ray tube assembly by hand to its start position. Unplug K6.
Press the T key on the Multitimer.
Motor M1 runs and error message E3 32 appears?
no
yes
Light barrier V1 defective. Replace.
Are contacts K4 and X5.1 - 4 OK?
no
Repair contact problem
yes
Check cable L5 for continuity.
OK?
no
Repair
or
replace
yes
Check the winding resistors with a multimeter.
Is resistance 5 Ω ± 15 %?
no
Motor M1 defective.
Replace, see page 6 - 5
yes
Check connection between winding and motor housing with continuity tester.
Does connection exist?
no
Replace board DX1
• Perform
'Adjusting board DX1',
see page 4 - 31
yes
Motor M1 defective. Replace,
see page 6 - 5

Continued on next page

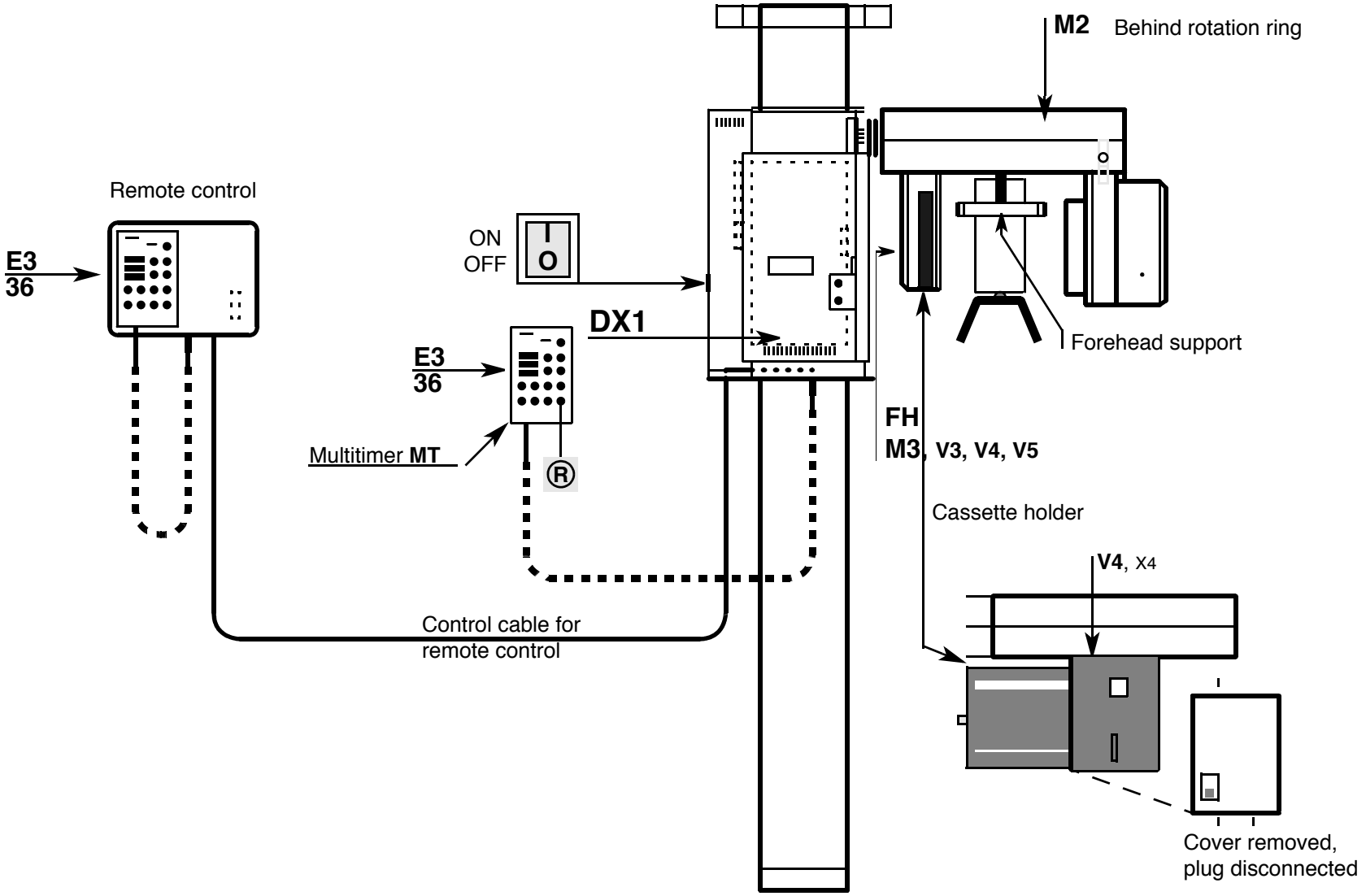
3.23 Correcting error of messages E3 32, E3 33: Start position for rotation was not exited/reached.


Top view
Tension bolt for belt
Rubber coating on inside
Belt pulley
Coupling
Motor M1
Counter-balancing pulley
M1/K4 behind rotation ring
V1/V7 in rotation ring,
K6/K8 behind rotation ring
L4
Rotation ring
X-ray head
ON
OFF
I
O
DX1
X5
X7
Remote control
E3
32
Multitimer MT
R
Control cable for
remote control

continued

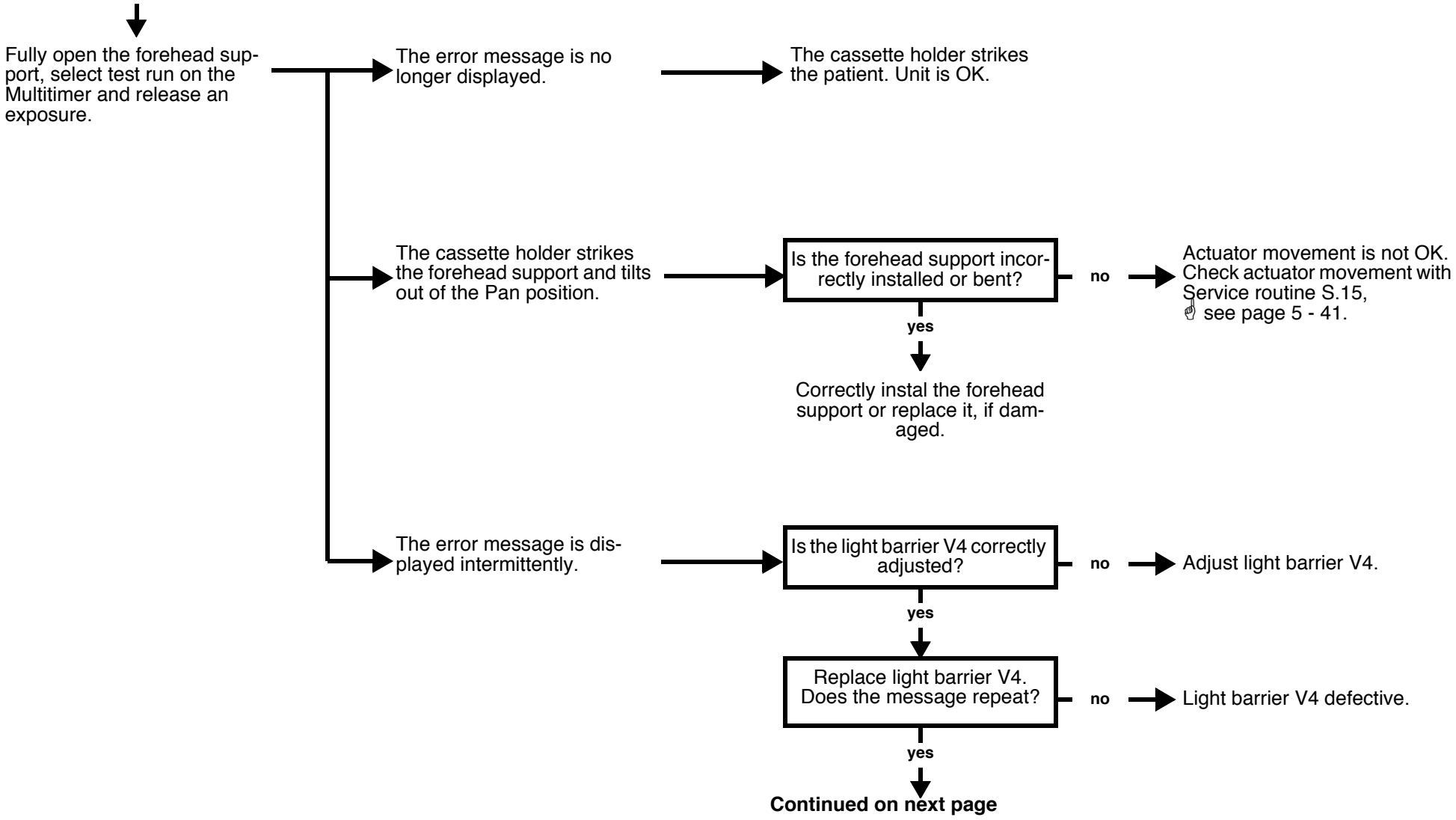

X-ray tube assembly collides with rotation start position, error message E3 32 appears after app 16 s.
Is holding bracket of light barrier V1 maladjusted or bent?
no
Replace light barrier V1. Press the T key on the Multitimer.
Does the error message repeat?
no
Light barrier V1 defective
yes
Adjust light barrier V1 or replace light barrier with holding bracket.
yes
Replace board DX1
• Perform **'Adjusting board DX1',** see page 4 - 31

3.23 Correcting error of messages E3 32, E3 33: Start position for rotation was not exited/reached.

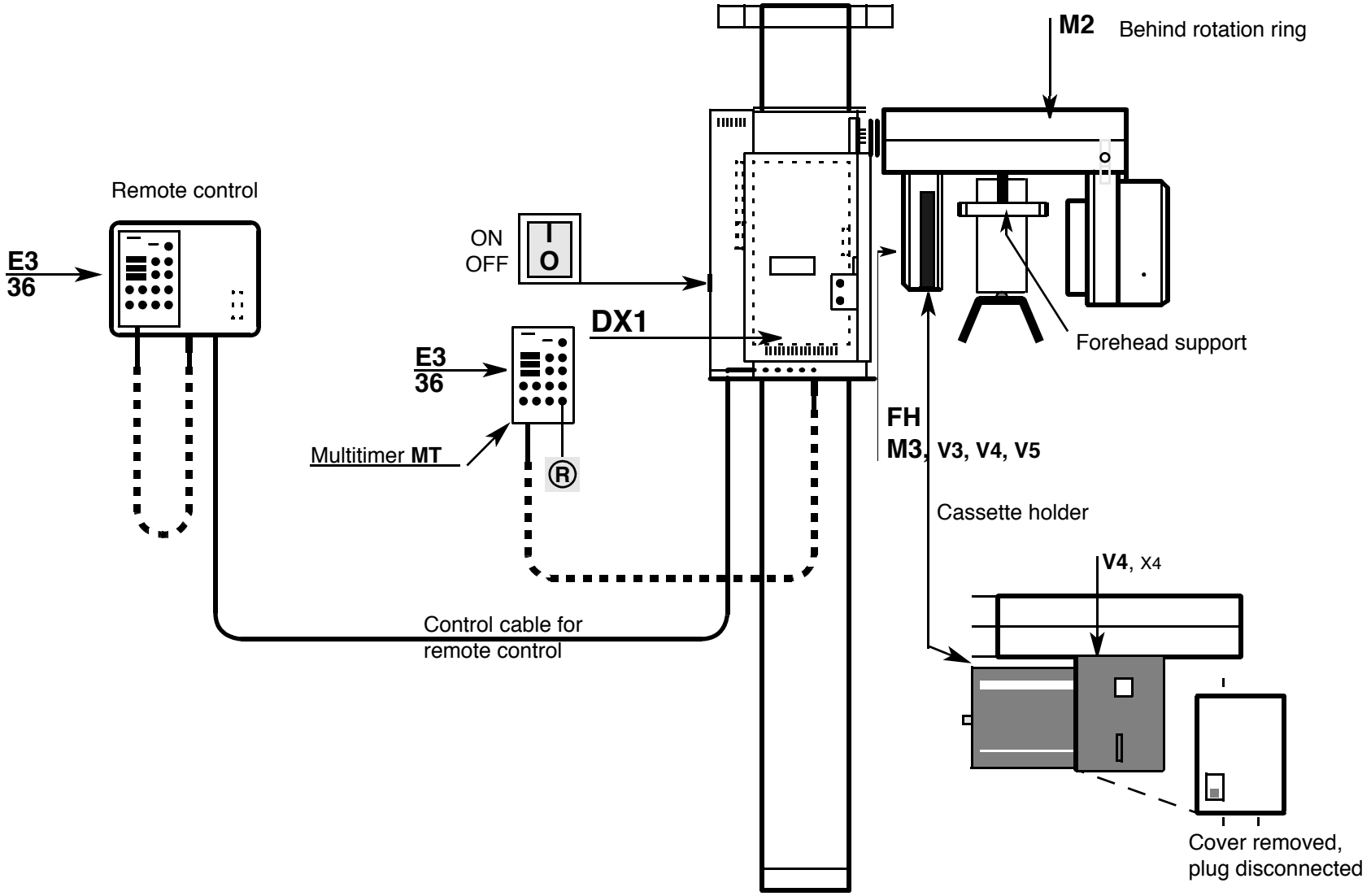

M2
Behind rotation ring
Remote control
E3
36
ON
OFF
I
O
DX1
E3
36
Multitimer MT
Forehead support
FH
M3, V3, V4, V5
Cassette holder
V4, X4
Control cable for
remote control
Cover removed,
plug disconnected

ORTHOPHOS 3

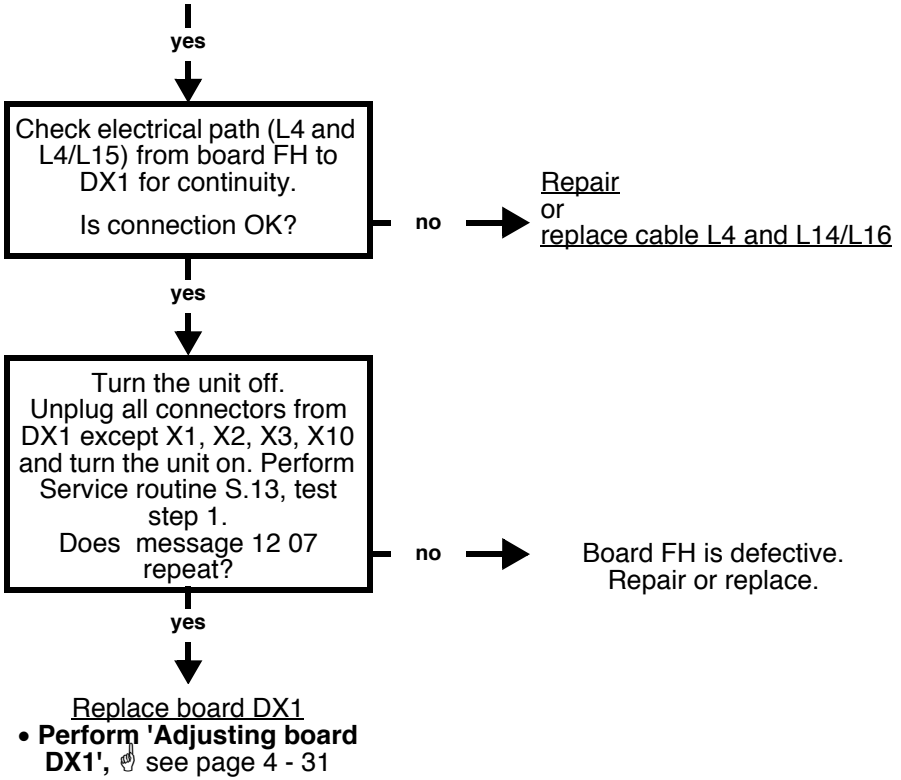
- **Body parts or clothing, bandages and the like must not interfere with unit functions.**
  Start test run with the T key. During the movement the cassette holder must not come into contact with the patient.
  Does retaining spring still have sufficient mechanical tension?


Fully open the forehead support, select test run on the Multitimer and release an exposure.
The error message is no longer displayed.
The cassette holder strikes the patient. Unit is OK.
The cassette holder strikes the forehead support and tilts out of the Pan position.
Is the forehead support incorrectly installed or bent?
no
Actuator movement is not OK. Check actuator movement with Service routine S.15, see page 5 - 41.
yes
Correctly instal the forehead support or replace it, if damaged.
The error message is displayed intermittently.
Is the light barrier V4 correctly adjusted?
no
Adjust light barrier V4.
yes
Replace light barrier V4. Does the message repeat?
no
Light barrier V4 defective.
yes
Continued on next page

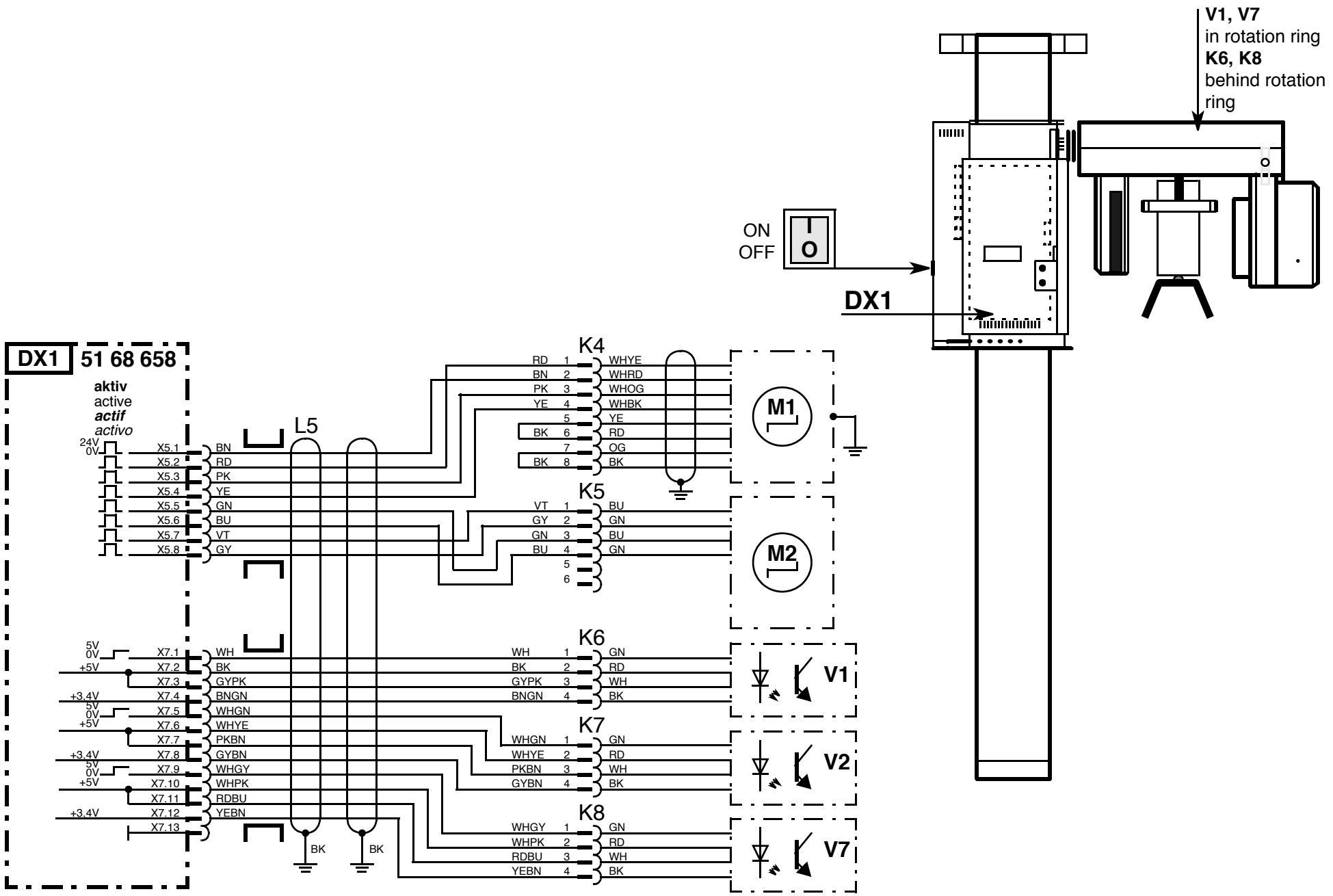
3.24 Correcting error of message E3 36: Cassette holder was swivelled from the Pan position during Pan exposure.


M2
Behind rotation ring
Remote control
E3
36
ON
OFF
I
O
DX1
E3
36
Multitimer MT
R
Forehead support
FH
M3, V3, V4, V5
Cassette holder
V4, X4
Control cable for
remote control
Cover removed,
plug disconnected

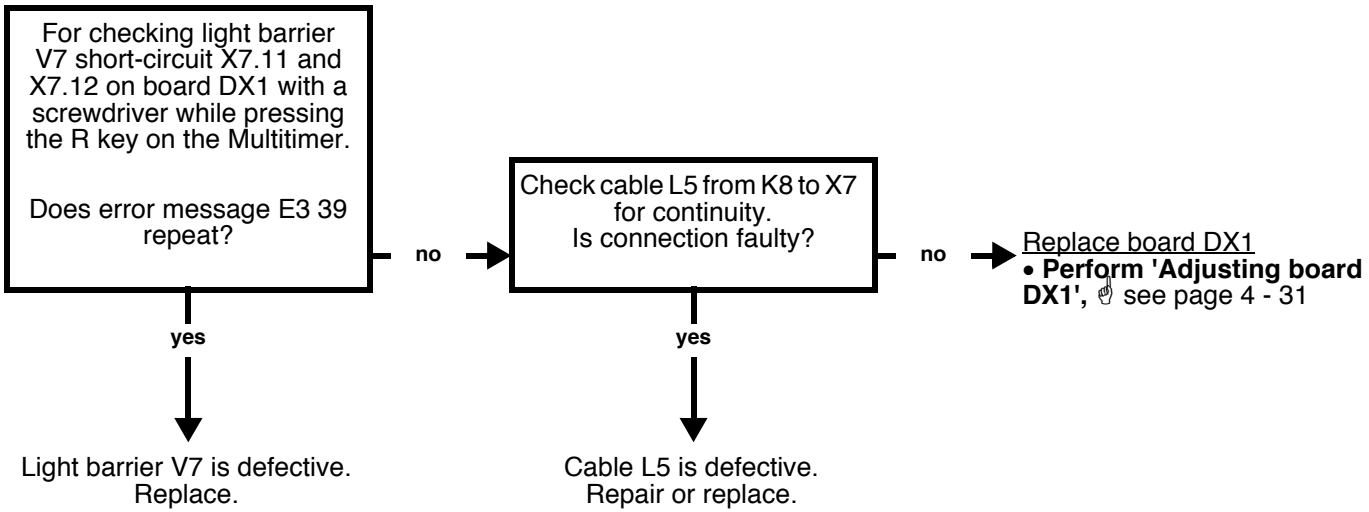
continued


yes
Check electrical path (L4 and L4/L15) from board FH to DX1 for continuity.
Is connection OK?
no
Repair
or
replace cable L4 and L14/L16
yes
Turn the unit off. Unplug all connectors from DX1 except X1, X2, X3, X10 and turn the unit on. Perform Service routine S.13, test step 1.
Does message 12 07 repeat?
no
Board FH is defective.
Repair or replace.
yes
Replace board DX1
• Perform 'Adjusting board DX1', see page 4 - 31

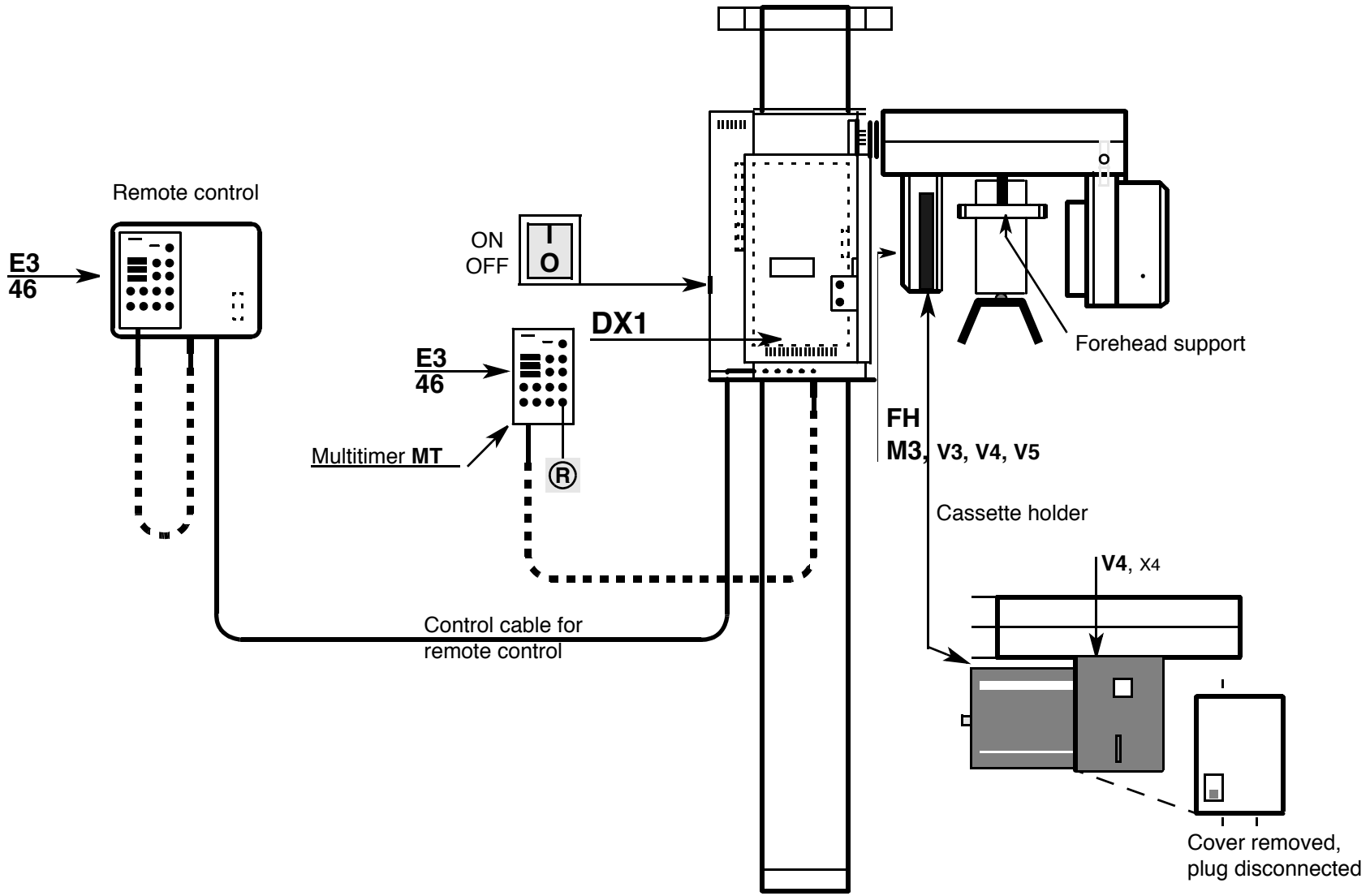
3.24 Correcting error of message E3 36: Cassette holder was swivelled from the Pan position during Pan exposure.

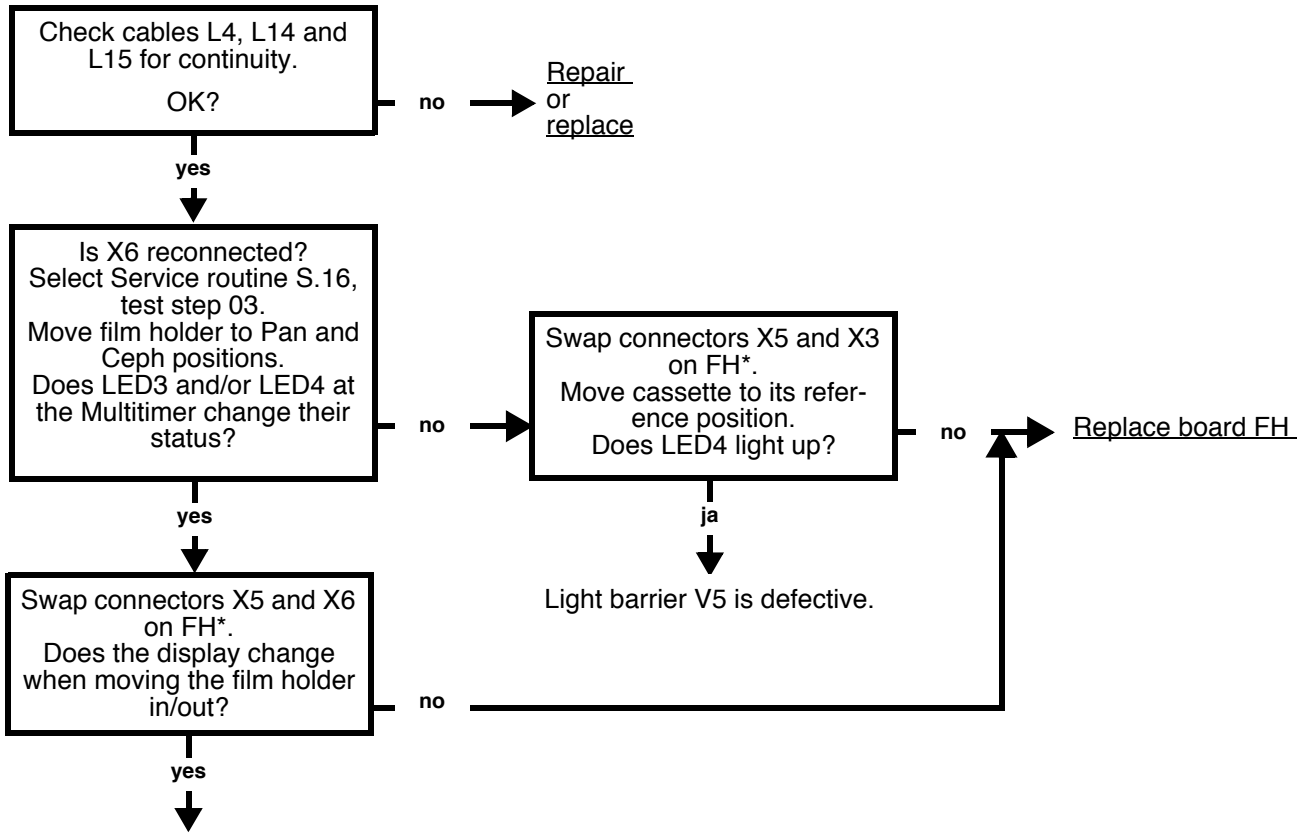

V1, V7
in rotation ring
K6, K8
behind rotation
ring
ON
OFF
I
O
DX1
DX1 51 68 658
aktiv
active
actif
activo
24V
0V
X5.1 BN
X5.2 RD
X5.3 PK
X5.4 YE
X5.5 GN
X5.6 BU
X5.7 VT
X5.8 GY
L5
BK
BK
K4
RD 1 WHYE
BN 2 WHRD
PK 3 WHOG
YE 4 WHBK
5 YE
BK 6 RD
7 OG
BK 8 BK
K5
VT 1 BU
GY 2 GN
GN 3 BU
BU 4 GN
5
6
M1
M2
5V
0V
+5V
+3.4V
X7.1 WH
X7.2 BK
X7.3 GYPK
X7.4 BNGN
X7.5 WHGN
X7.6 WHYE
X7.7 PKBN
X7.8 GYBN
X7.9 WHGY
X7.10 WHPK
X7.11 RDBU
X7.12 YEBN
X7.13
K6
WH 1 GN
BK 2 RD
GYPK 3 WH
BNGN 4 BK
K7
WHGN 1 GN
WHYE 2 RD
PKBN 3 WH
GYBN 4 BK
K8
WHGY 1 GN
WHPK 2 RD
RDBU 3 WH
YEBN 4 BK
V1
V2
V7

- **Is seating of plugs K6, K and K8 and X7 on board DX1 OKi?**
  Check V1, Function test with Service Routine S.14.


For checking light barrier V7 short-circuit X7.11 and X7.12 on board DX1 with a screwdriver while pressing the R key on the Multitimer.
Does error message E3 39 repeat?
no
Check cable L5 from K8 to X7 for continuity.
Is connection faulty?
no
Replace board DX1
• Perform 'Adjusting board DX1', see page 4 - 31
yes
yes
Light barrier V7 is defective. Replace.
Cable L5 is defective. Repair or replace.

3.25 Correcting error of message E3 39 / E3 42: Light barrier for Ceph position rotation indicates invalid status

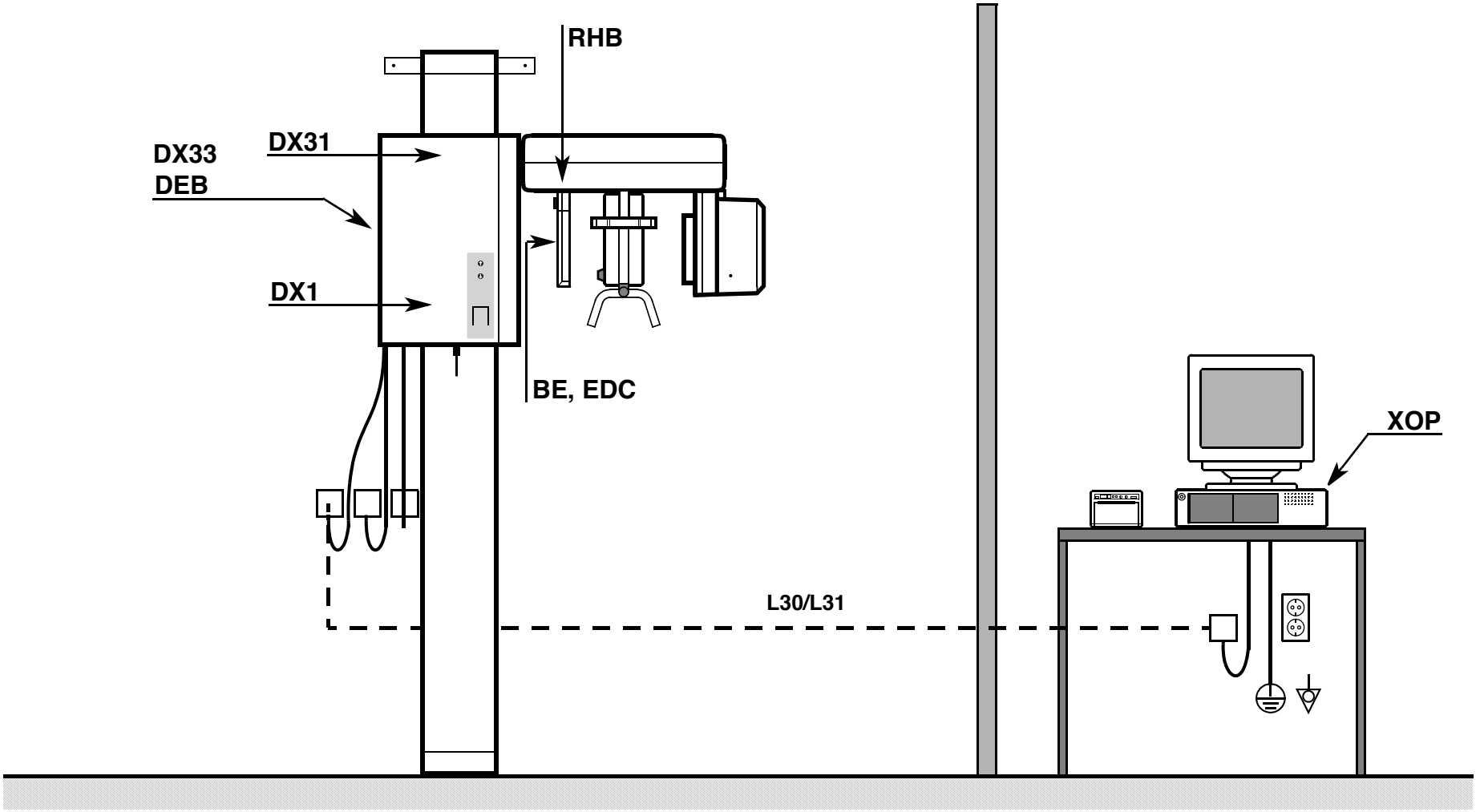

Remote control
E3
46
ON
OFF
I
O
DX1
E3
46
Multitimer MT
R
Forehead support
FH
M3, V3, V4, V5
Cassette holder
V4, X4
Control cable for
remote control
Cover removed,
plug disconnected

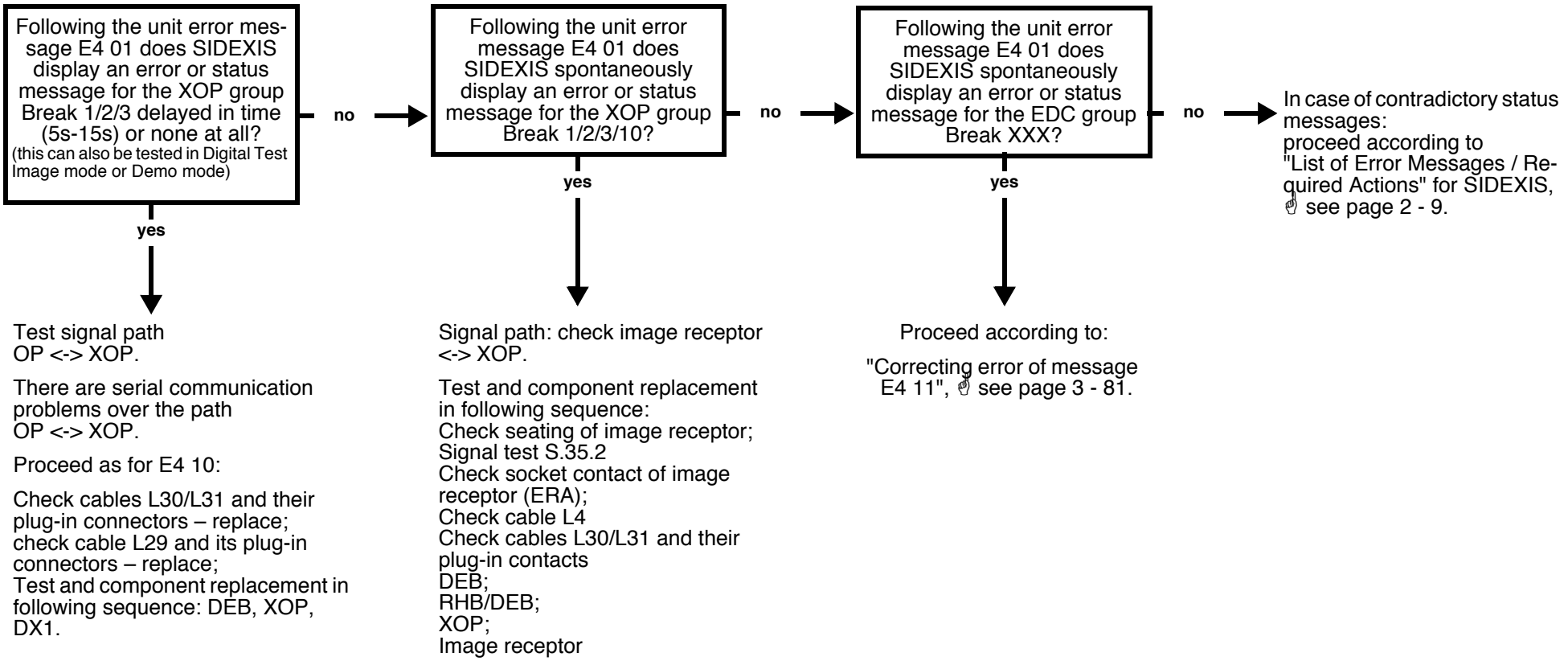

Check cables L4, L14 and L15 for continuity.
OK?
no
Repair or replace
yes
Is X6 reconnected? Select Service routine S.16, test step 03. Move film holder to Pan and Ceph positions. Does LED3 and/or LED4 at the Multitimer change their status?
no
Swap connectors X5 and X3 on FH*. Move cassette to its reference position. Does LED4 light up?
no
Replace board FH
yes
ja
Light barrier V5 is defective.
Swap connectors X5 and X6 on FH*. Does the display change when moving the film holder in/out?
no
yes
LED 3 must light up for the Pan position, if light barrier V4 is not defective.
LED 4 must light up for the Ceph position, if light barrier V5 is not defective.

* After the test put the connector back to its proper position.

3.26 Correcting error of message E3 46: Position of cassette holder cannot be determined.

up to serial no. 30 999 ORTHOPHOS 3 DS



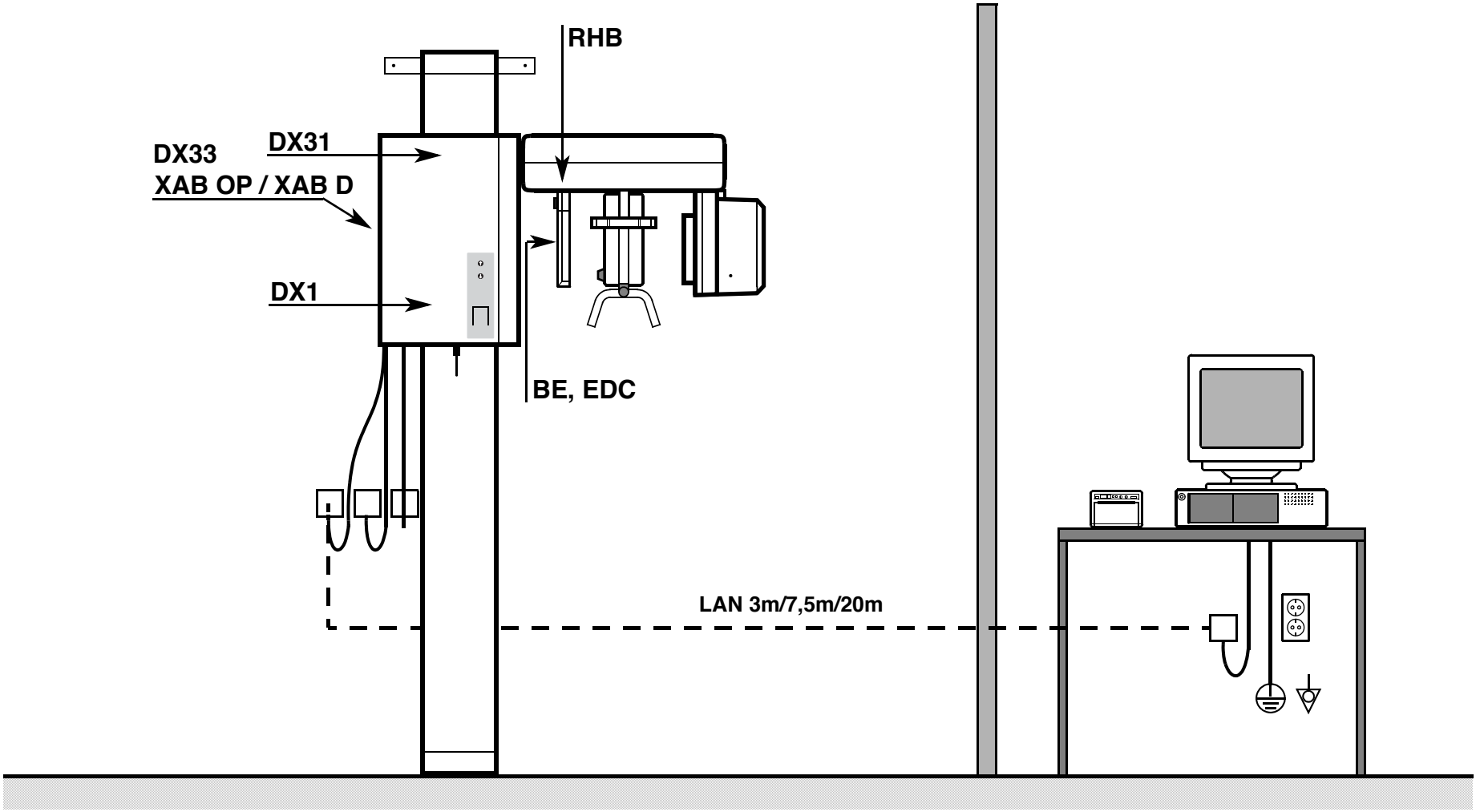

Following the unit error message E4 01 does SIDEXIS display an error or status message for the XOP group Break 1/2/3 delayed in time (5s-15s) or none at all?
(this can also be tested in Digital Test Image mode or Demo mode)
no
yes
Following the unit error message E4 01 does SIDEXIS spontaneously display an error or status message for the XOP group Break 1/2/3/10?
no
yes
Following the unit error message E4 01 does SIDEXIS spontaneously display an error or status message for the EDC group Break XXX?
no
yes
In case of contradictory status messages:
proceed according to
"List of Error Messages / Required Actions" for SIDEXIS,
see page 2 - 9.
Test signal path
OP <-> XOP.
There are serial communication problems over the path
OP <-> XOP.
Proceed as for E4 10:
Check cables L30/L31 and their plug-in connectors – replace;
check cable L29 and its plug-in connectors – replace;
Test and component replacement in following sequence: DEB, XOP, DX1.
Signal path: check image receptor <-> XOP.
Test and component replacement in following sequence:
Check seating of image receptor;
Signal test S.35.2
Check socket contact of image receptor (ERA);
Check cable L4
Check cables L30/L31 and their plug-in contacts
DEB;
RHB/DEB;
XOP;
Image receptor
Proceed according to:
"Correcting error of message E4 11", see page 3 - 81.

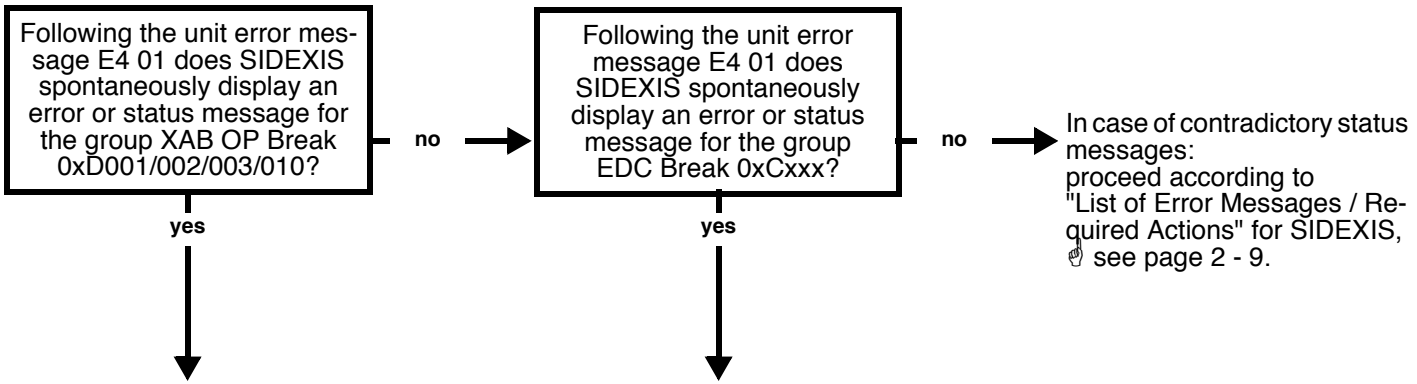
NOTE

SIDEXIS error message:	Displayed in error box, require acknowledging. Occur if no image data present. (XOP Break, EDC Break etc.)
SIDEXIS status messages:	Displayed for limited time in exposure readiness dialog box (XOP Break, EDC Break etc.) when image data are present.

3.27 Correcting error of message E4 01: Exposure aborted by SIDEXIS (with XOP).

from serial no. 31 000 ORTHOPHOS 3 DS



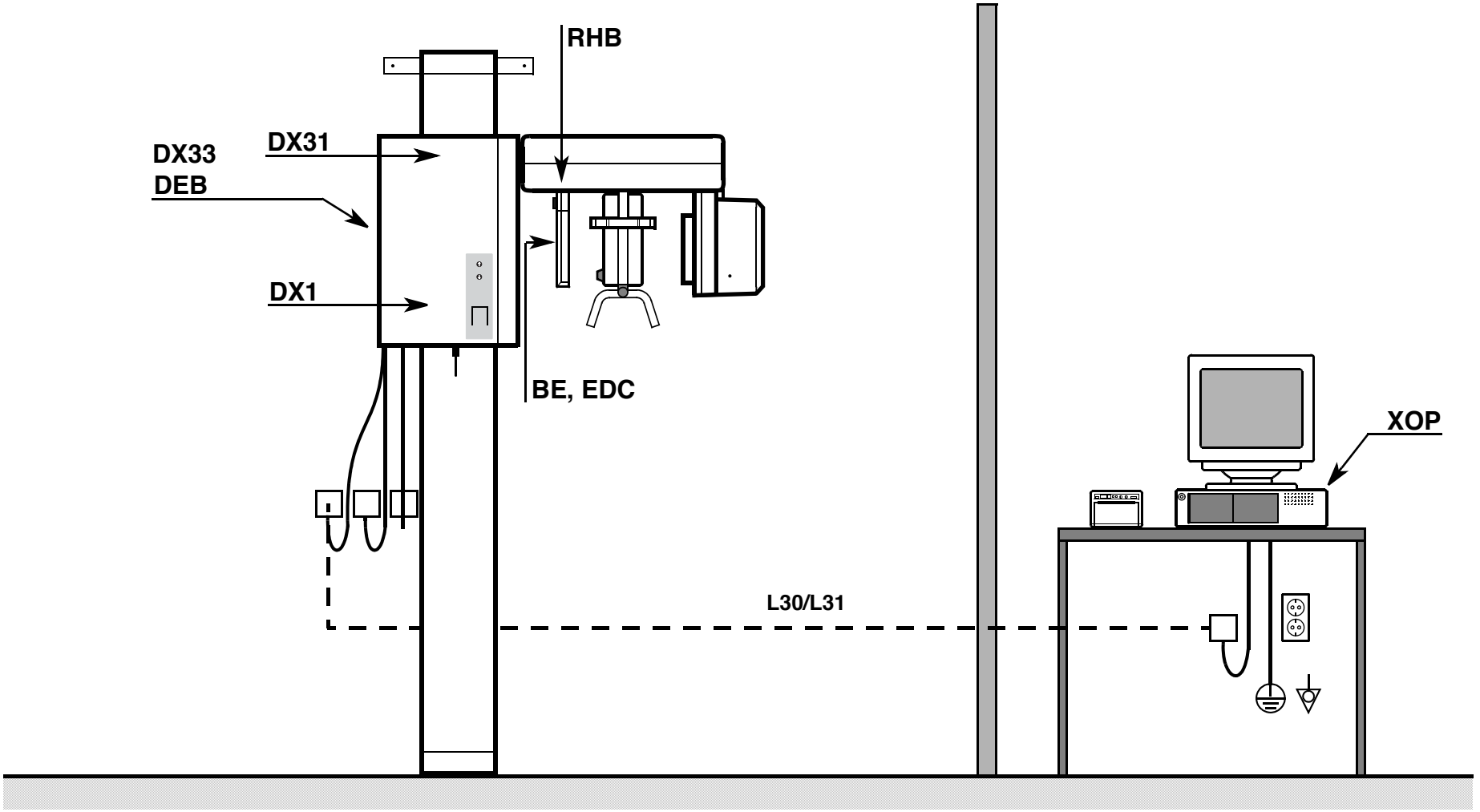

Following the unit error message E4 01 does SIDEXIS spontaneously display an error or status message for the group XAB OP Break 0xD001/002/003/010?
no
Following the unit error message E4 01 does SIDEXIS spontaneously display an error or status message for the group EDC Break 0xCxxx?
no
In case of contradictory status messages:
proceed according to
"List of Error Messages / Required Actions" for SIDEXIS,
see page 2 - 9.
yes
yes
Signal path: check image receptor <-> XAB OP <-> PC.
Test and component replacement in following sequence:
Check seating of image receptor;
Signal test S.35.1 (from Memory card V030);
and S.32.1(Pan);
Check socket contact of image receptor (ERA);
Check RHB;
Check cable L4;
Check XAB OP;
Check LAN cables and their connectors;
PC
Proceed according to:
"Correcting error of message E4 11", see page 3 - 81.

NOTE

SIDEXIS error message:	Displayed in error box, require acknowledging. Occur if no image data present. (XAB OP Break, EDC Break etc.)
SIDEXIS status messages:	Displayed for limited time in exposure readiness dialog box (XAB OP Break, EDC Break etc.) when image data are present.

3.28 Correcting error of message E4 01: Exposure aborted by SIDEXIS (with XAB)

up to serial no. 30 999 ORTHOPHOS 3 DS



Is PC cable L30/L31 correctly inserted?

no → Make connection

yes

Is LED LD 281(green) on the XOP lit up?

no → Restart PC and select SIDEXIS
Check XOP for correct seating or replace

yes

Is LED V950 on the DEB lit up?

no → Check connection for cable L30/L31 – replace
Replace XOP
Replace DEB

yes

Select Service routine S.35.1 and observe kV indication.

(01: PC power signal recognized by DX1)
(00: PC power signal not recognized by DX1)

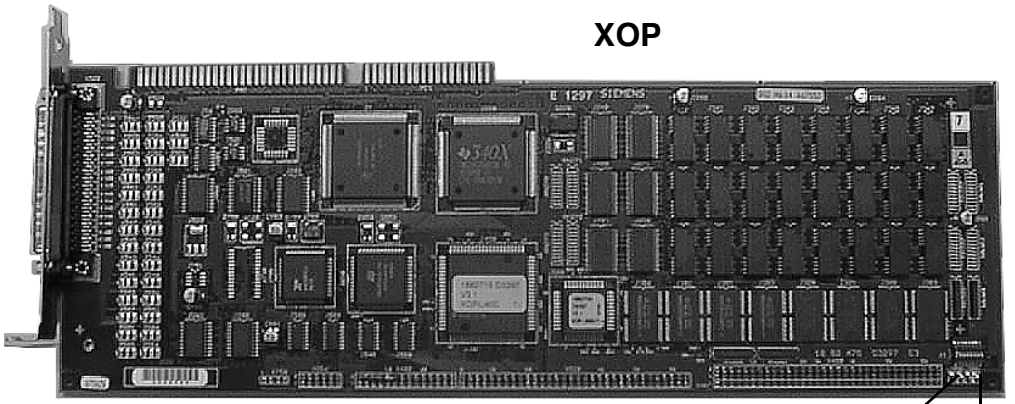
Is the PC power signal recognized?

no → Check DX33. If the LEDs are lit up, the automatic cutout is OK.
Check connection L28 - L29 – switch leads
Perform DX1 input test (S.13.1) ,
☝ see page 5 - 35
Replace DX1
Replace DEB

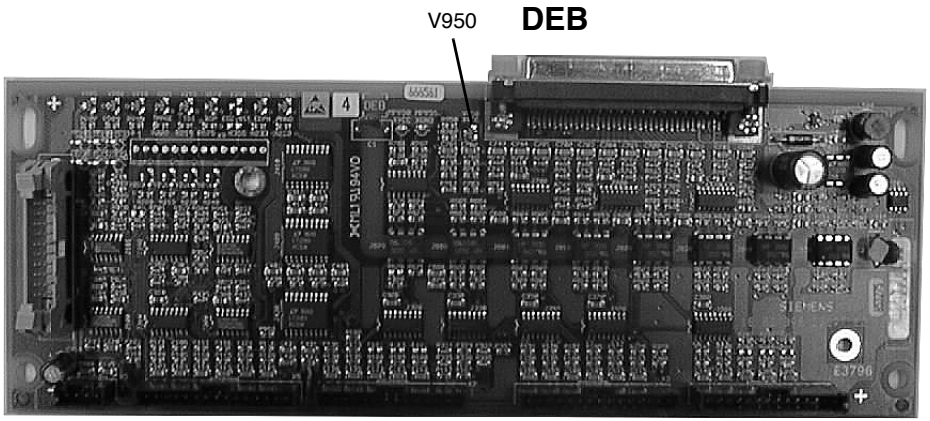
yes

Repeat exposure

XOP

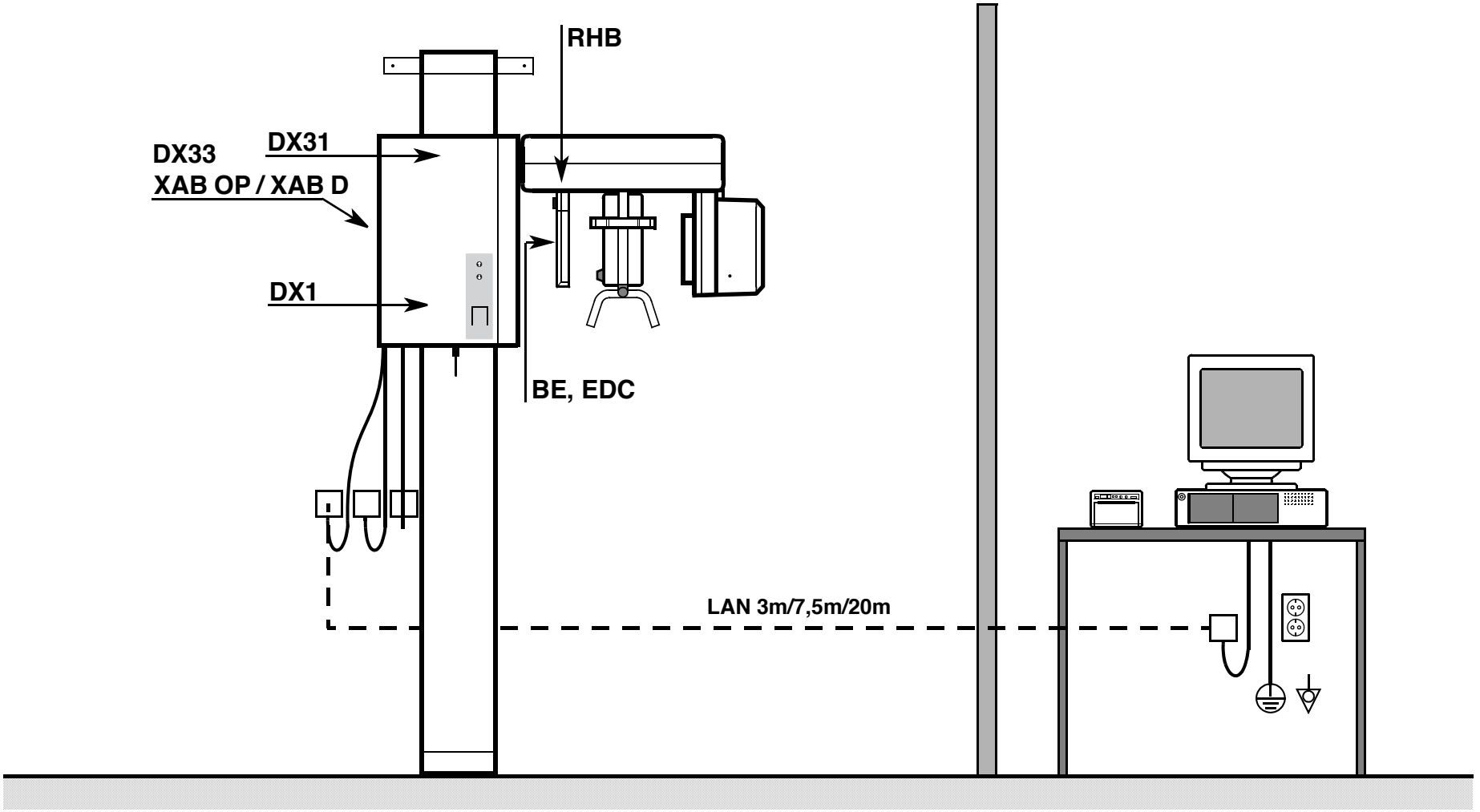


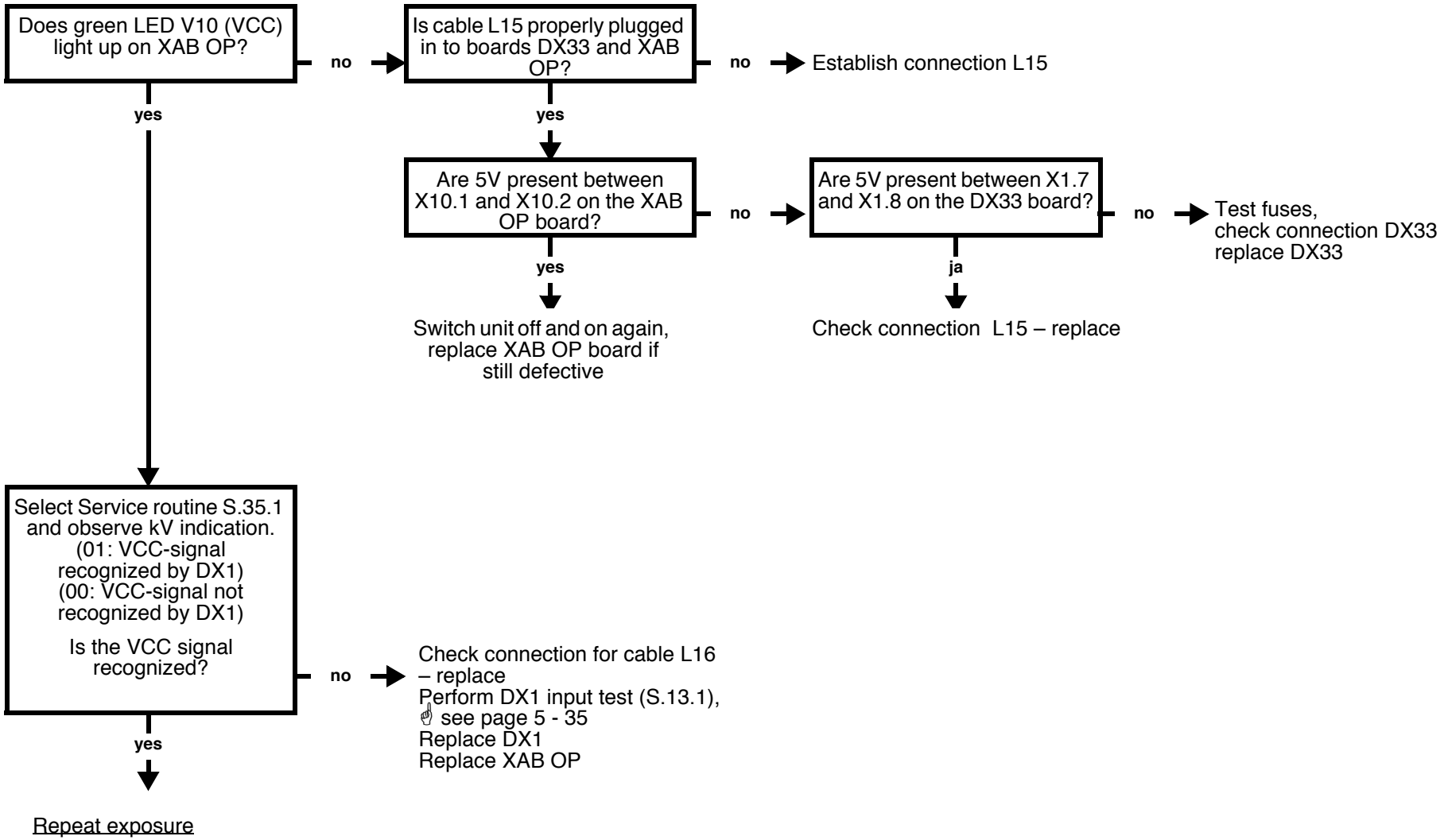
DEB



3.29 Correcting error of message E4 06: Fault at one of the supply voltages (with XOP).

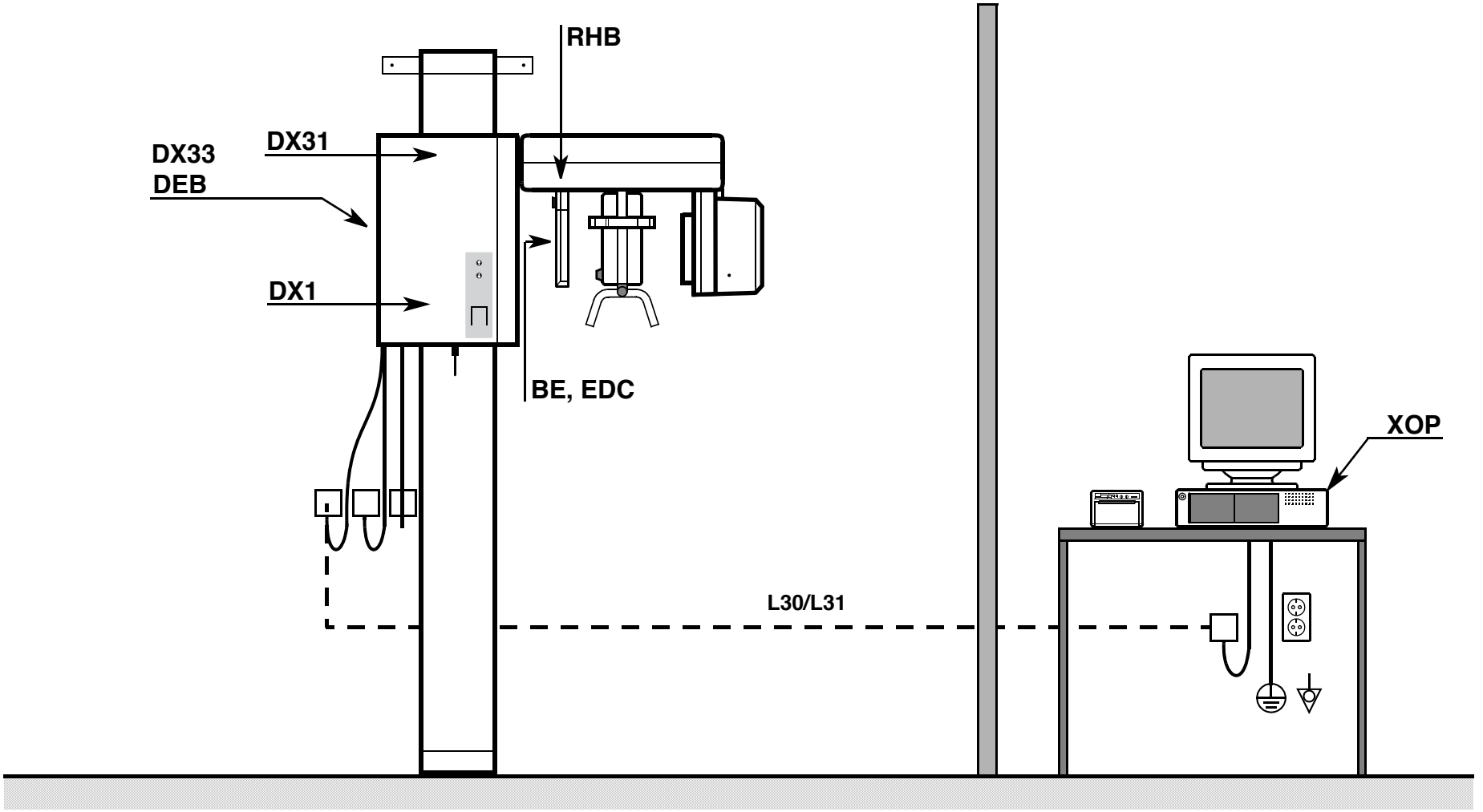
from serial no. 31 000 ORTHOPHOS 3 DS



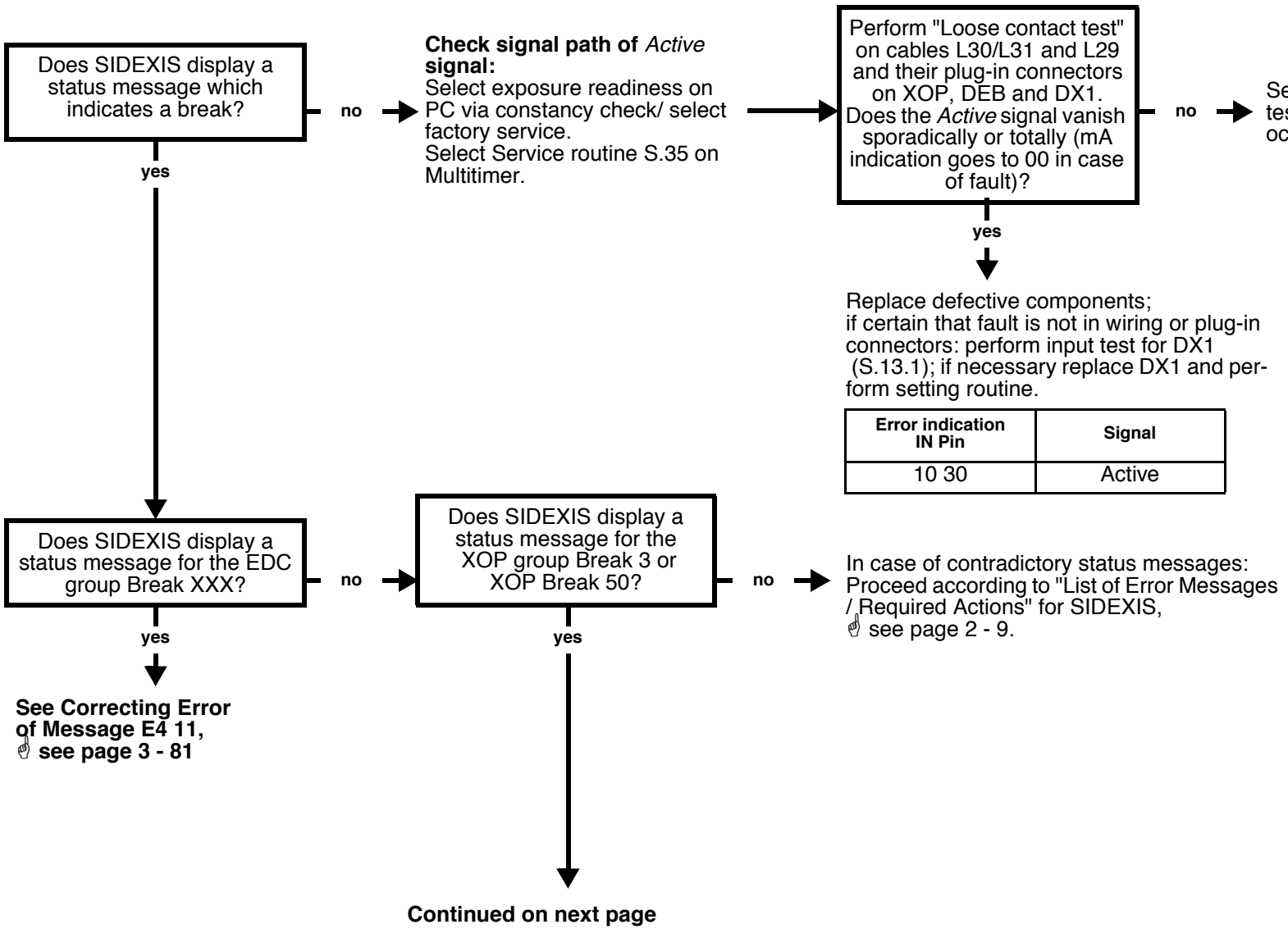

Does green LED V10 (VCC) light up on XAB OP?
no
Is cable L15 properly plugged in to boards DX33 and XAB OP?
no
Establish connection L15
yes
yes
Are 5V present between X10.1 and X10.2 on the XAB OP board?
no
Are 5V present between X1.7 and X1.8 on the DX33 board?
no
Test fuses, check connection DX33 replace DX33
yes
ja
Switch unit off and on again, replace XAB OP board if still defective
Check connection L15 – replace
Select Service routine S.35.1 and observe kV indication. (01: VCC-signal recognized by DX1) (00: VCC-signal not recognized by DX1)
Is the VCC signal recognized?
no
Check connection for cable L16 – replace
Perform DX1 input test (S.13.1), see page 5 - 35
Replace DX1
Replace XAB OP
yes
Repeat exposure

3.30 Correcting error of message E4 06: Fault at one of the supply voltages (with XAB)

up to serial no. 30 999 ORTHOPHOS 3 DS



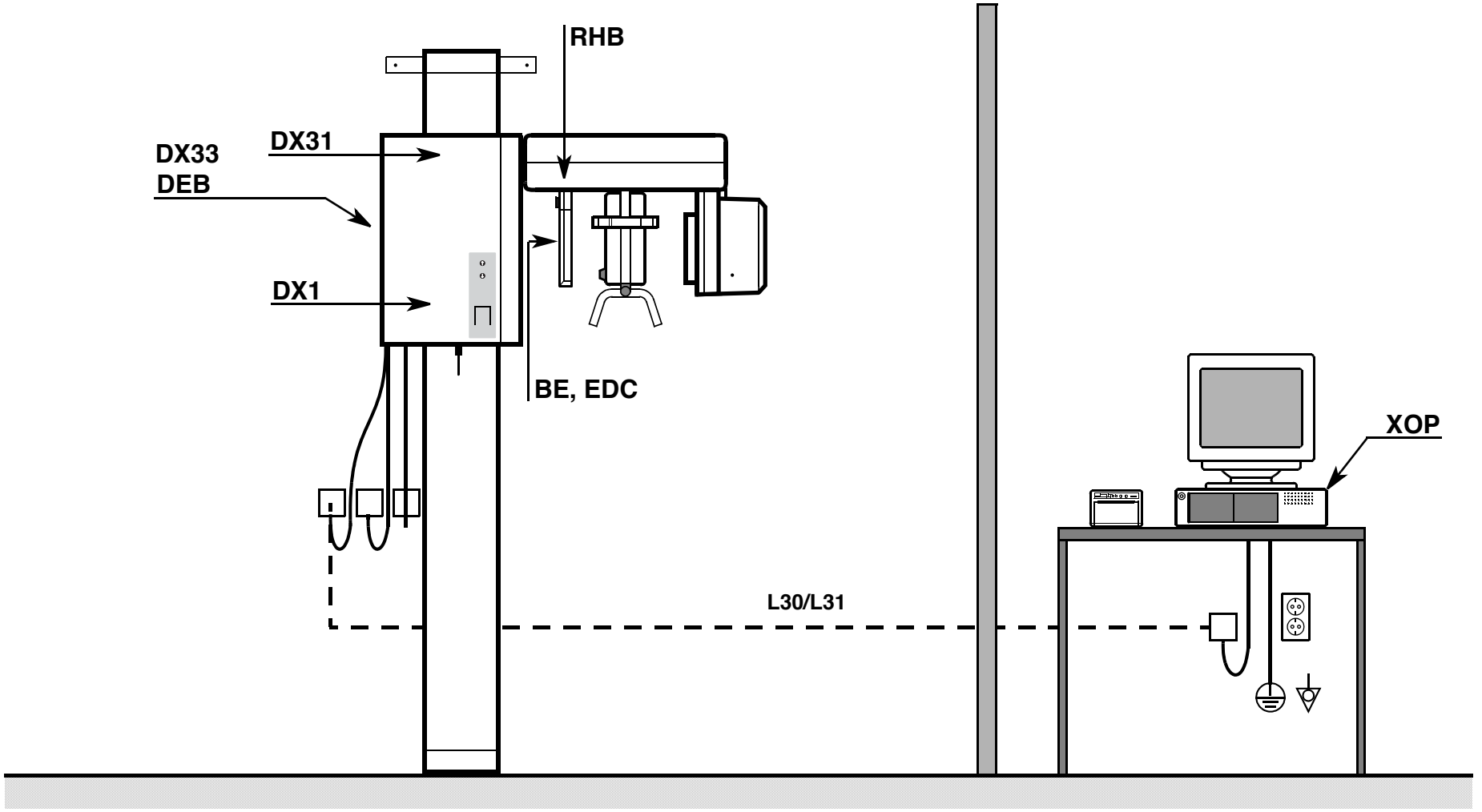
for normal operation only


Does SIDEXIS display a status message which indicates a break?
no
Check signal path of *Active* signal:
Select exposure readiness on PC via constancy check/ select factory service.
Select Service routine S.35 on Multitimer.
Perform "Loose contact test" on cables L30/L31 and L29 and their plug-in connectors on XOP, DEB and DX1.
Does the *Active* signal vanish sporadically or totally (mA indication goes to 00 in case of fault)?
no
Select Service routine S.01 and test with radiation until error occurs again.
yes
Replace defective components;
if certain that fault is not in wiring or plug-in connectors: perform input test for DX1 (S.13.1); if necessary replace DX1 and perform setting routine.
yes
Does SIDEXIS display a status message for the EDC group Break XXX?
no
Does SIDEXIS display a status message for the XOP group Break 3 or XOP Break 50?
no
In case of contradictory status messages:
Proceed according to "List of Error Messages / Required Actions" for SIDEXIS,
see page 2 - 9.
yes
See Correcting Error of Message E4 11,
see page 3 - 81
yes
Continued on next page

Error indication IN Pin	Signal
10 30	Active

3.31 Correcting error of message E4 08: Aborted by SIDEXIS during radiation (with XOP)

up to serial no. 30 999 ORTHOPHOS 3 DS



continued

Select Service routine S.32.2
and perform.
Switch on image receptor and TDI
with X-Ray button.
Observe LEDs on DEB:

Is correct position selected?
(V232 lit up)

Is image receptor
switched to
Image mode?
(V221 lit up)

Are TDI signals output?
(V216 glows with half
brightness)

Perform
"Loose connection test"
on L29 and its plug-in
connectors on DX1
and DEB.

Are all signals stable?

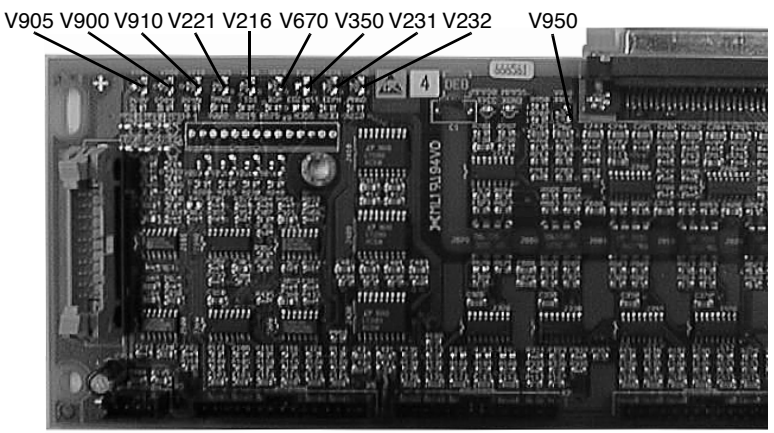
no → **Check signal path DX1 <-> DEB**
according to situation replace defective
component: wiring, DEB, DX1.

yes

Signal path: check image receptor <-> DEB <-> XOP
Test und component replacement in following sequence:

Check seating of image receptor;
Signal test S.35.2
Check socket contact of image receptor (ERA);
Check cable L4
Check cables L30/L31 and their plug-in connectors;
DEB;
RHB/DEB;
XOP;
Image receptor

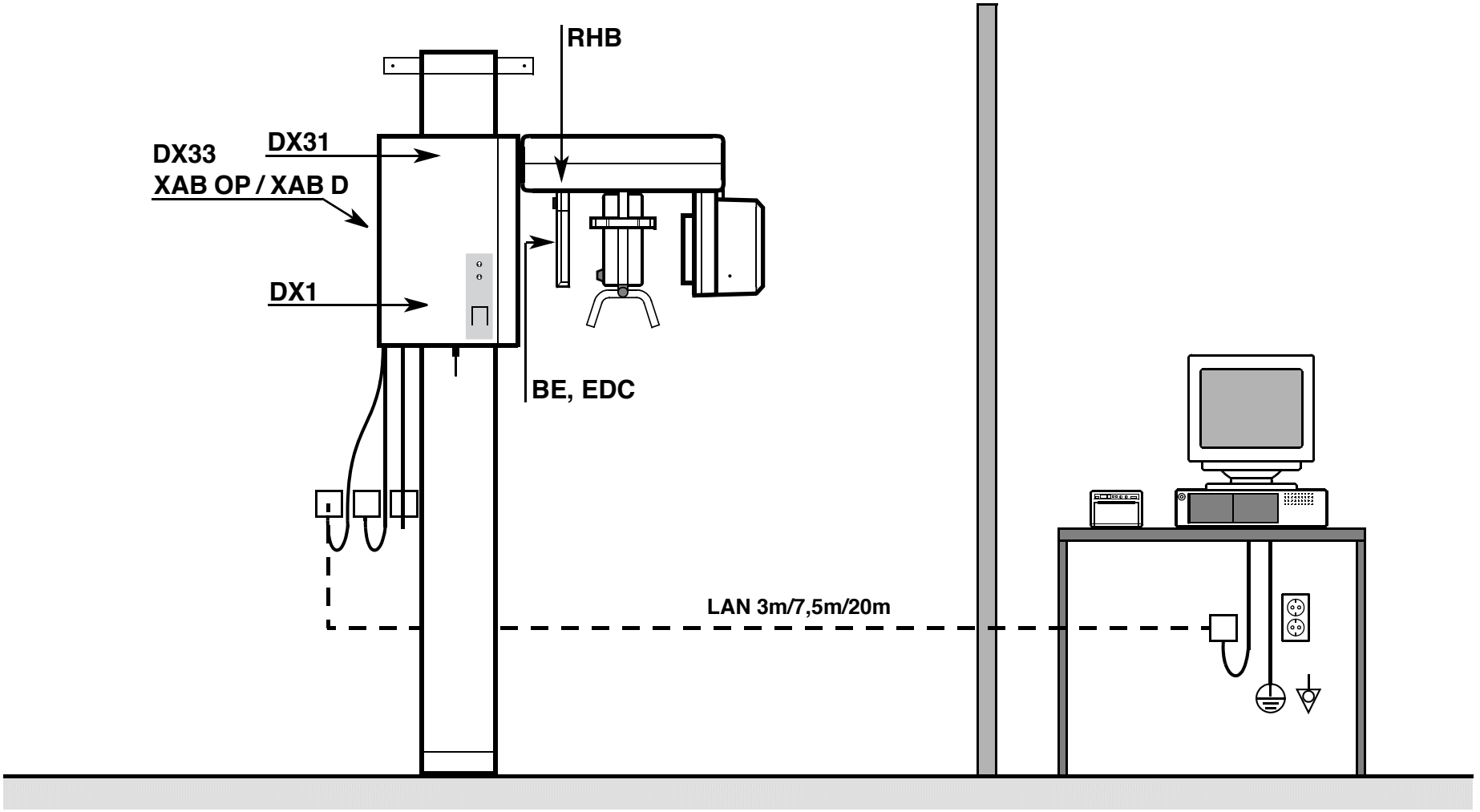
DEB



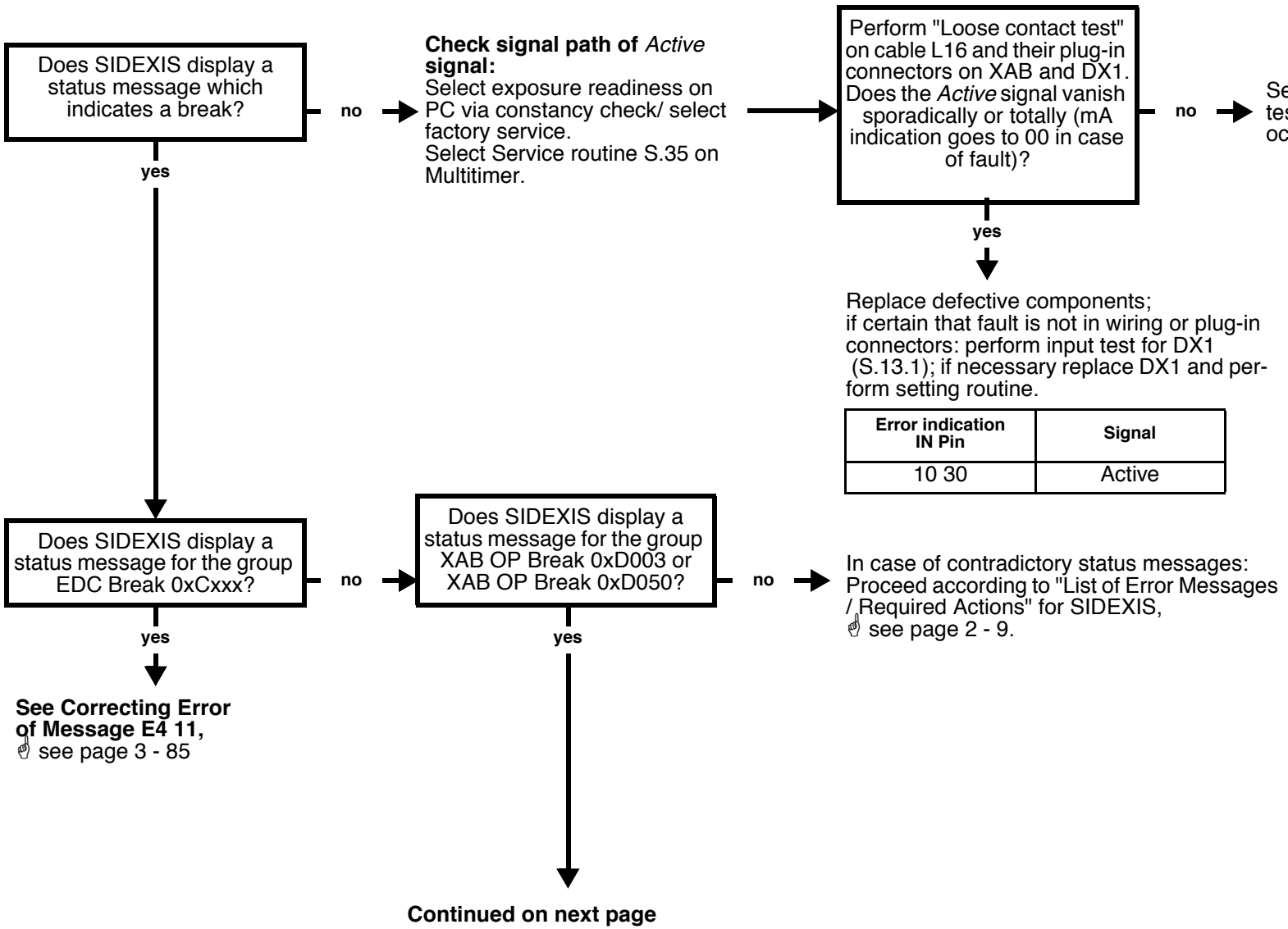
To simplify recognition of LEDs unscrew extension box and attach to side.

3.31 Correcting error of message E4 08: Aborted by SIDEXIS during radiation (with XOP)

from serial no. 31 000 ORTHOPHOS 3 DS

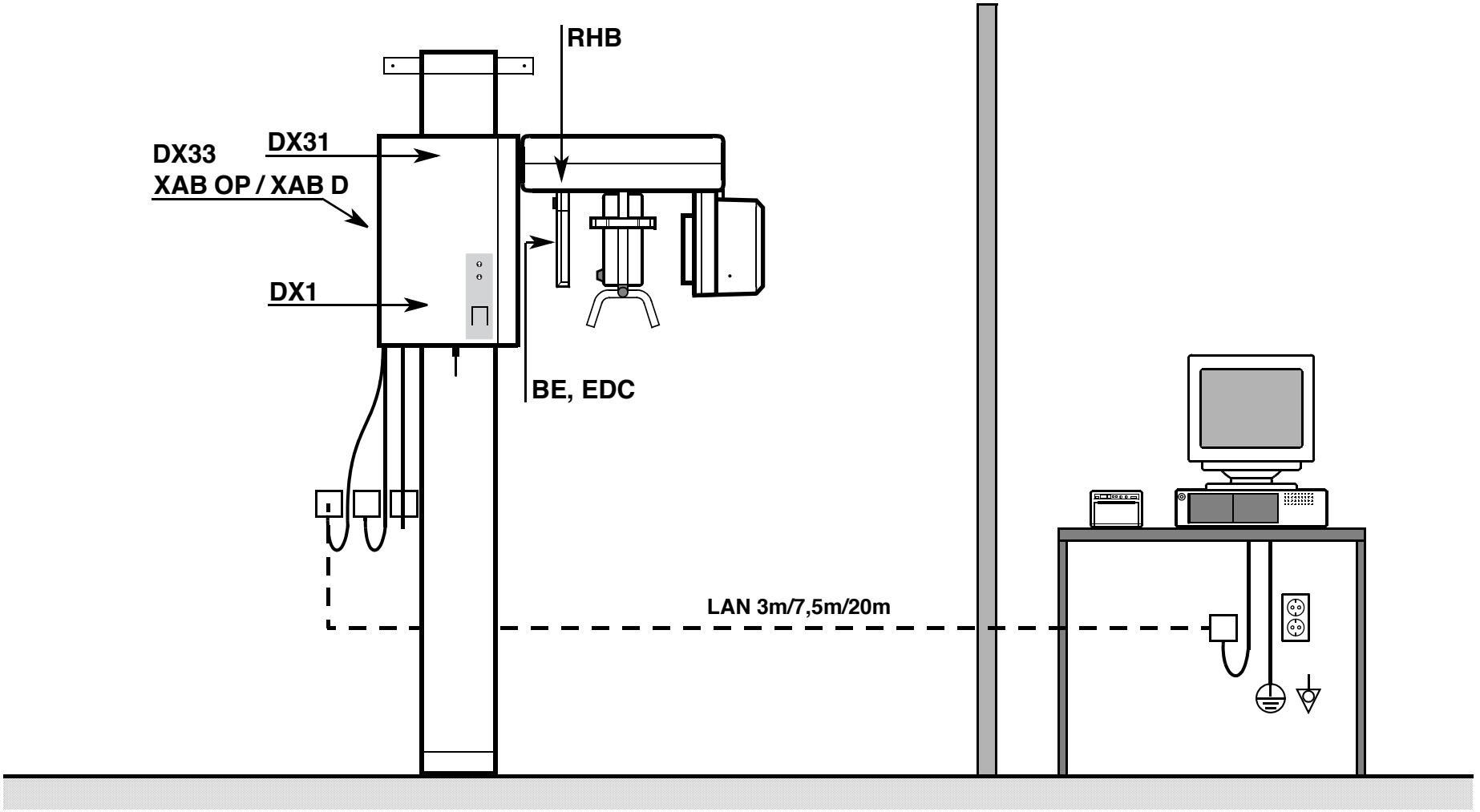


for normal operation only


Does SIDEXIS display a status message which indicates a break?
no
Check signal path of *Active* signal:
Select exposure readiness on PC via constancy check/ select factory service.
Select Service routine S.35 on Multitimer.
Perform "Loose contact test" on cable L16 and their plug-in connectors on XAB and DX1. Does the *Active* signal vanish sporadically or totally (mA indication goes to 00 in case of fault)?
no
Select Service routine S.01 and test with radiation until error occurs again.
yes
Replace defective components;
if certain that fault is not in wiring or plug-in connectors: perform input test for DX1 (S.13.1); if necessary replace DX1 and perform setting routine.
Error indication IN Pin
Signal
10 30
Active
Does SIDEXIS display a status message for the group EDC Break 0xCxxx?
no
Does SIDEXIS display a status message for the group XAB OP Break 0xD003 or XAB OP Break 0xD050?
no
In case of contradictory status messages:
Proceed according to "List of Error Messages / Required Actions" for SIDEXIS,
see page 2 - 9.
yes
See Correcting Error of Message E4 11,
see page 3 - 85
yes
Continued on next page

3.32 Correcting error of message E4 08: Aborted by SIDEXIS during radiation (with XAB)

from serial no. 31 000 ORTHOPHOS 3 DS



Select Service routine S.32.2 and perform.
Switch on image receptor and TDI with X-Ray button.
Observe LEDs on XAB OP:

Is correct position selected?
(V8 lights up for Pan)

Is image receptor switched to Image mode?
(V6 lit up)

Are TDI signals output?
(V5 glows with half brightness)

Perform "Loose connection test" on L16 and its plug-in connectors on DX1 and XAB OP.
Are all signals stable?

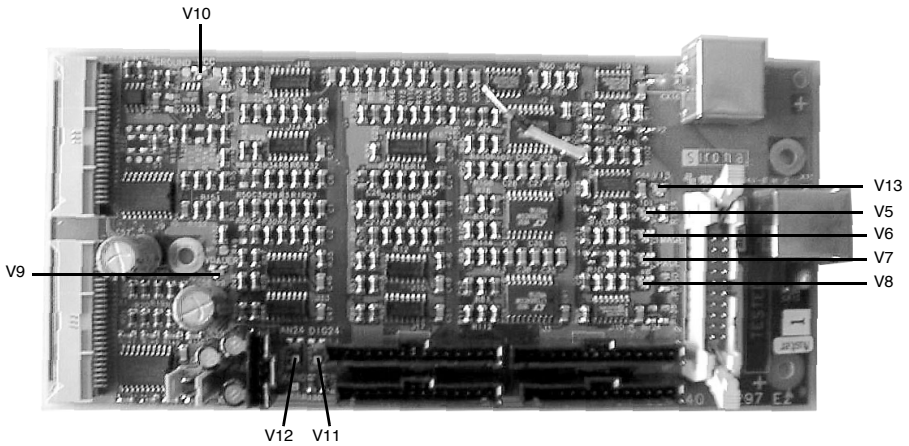
no → **Check signal path DX1 <-> XAB OP**
according to situation replace defective component: wiring, XAB OP, DX1.

yes

Signal path: check image receptor <-> XAB OP
Test und component replacement in following sequence:

Check seating of image receptor;
Signal test S.35.2;
Check socket contact of image receptor (ERA);
Check RHB
Check cable L4;
Check XAB OP;
Check LAN cables and their connectors;
PC

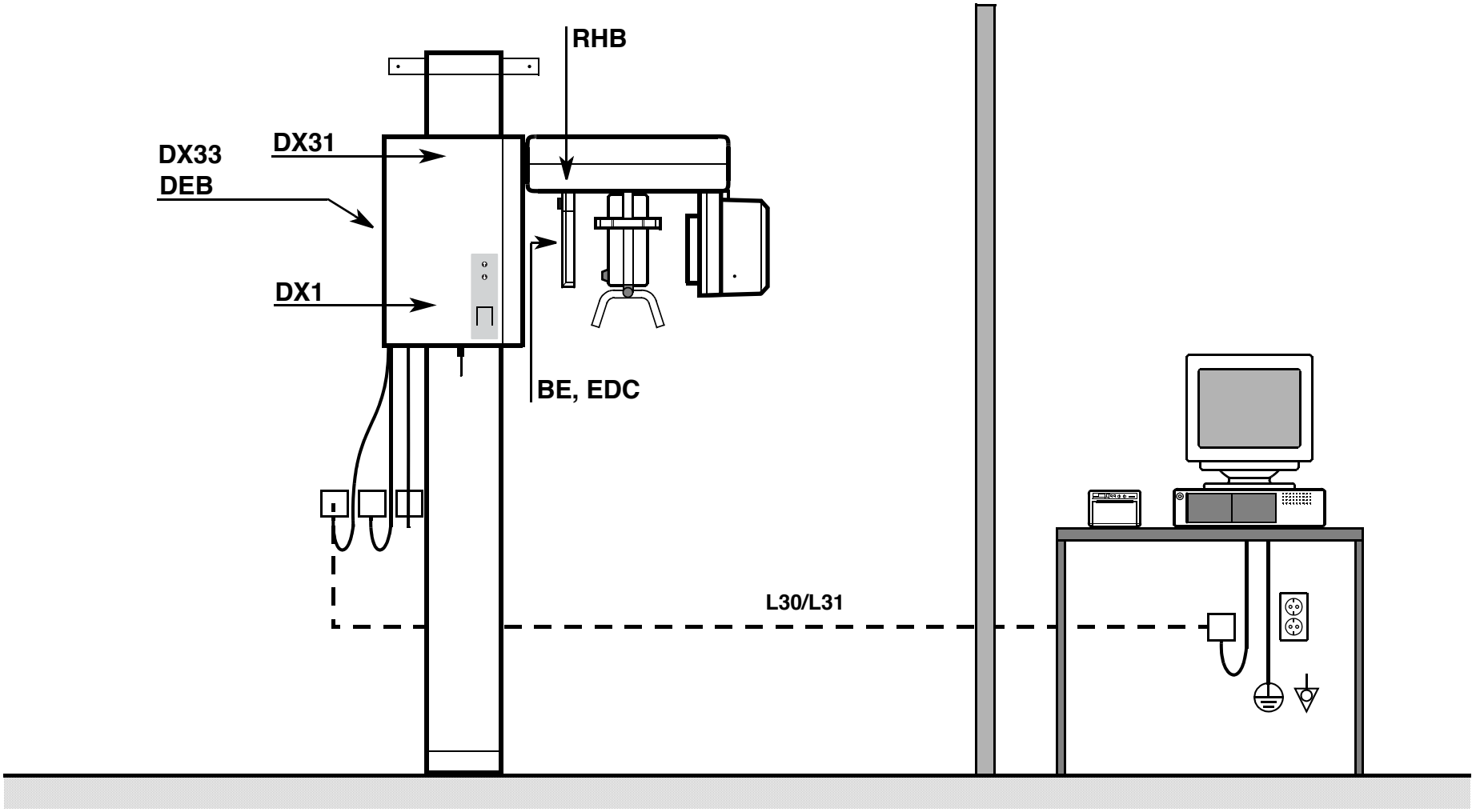
XAB OP



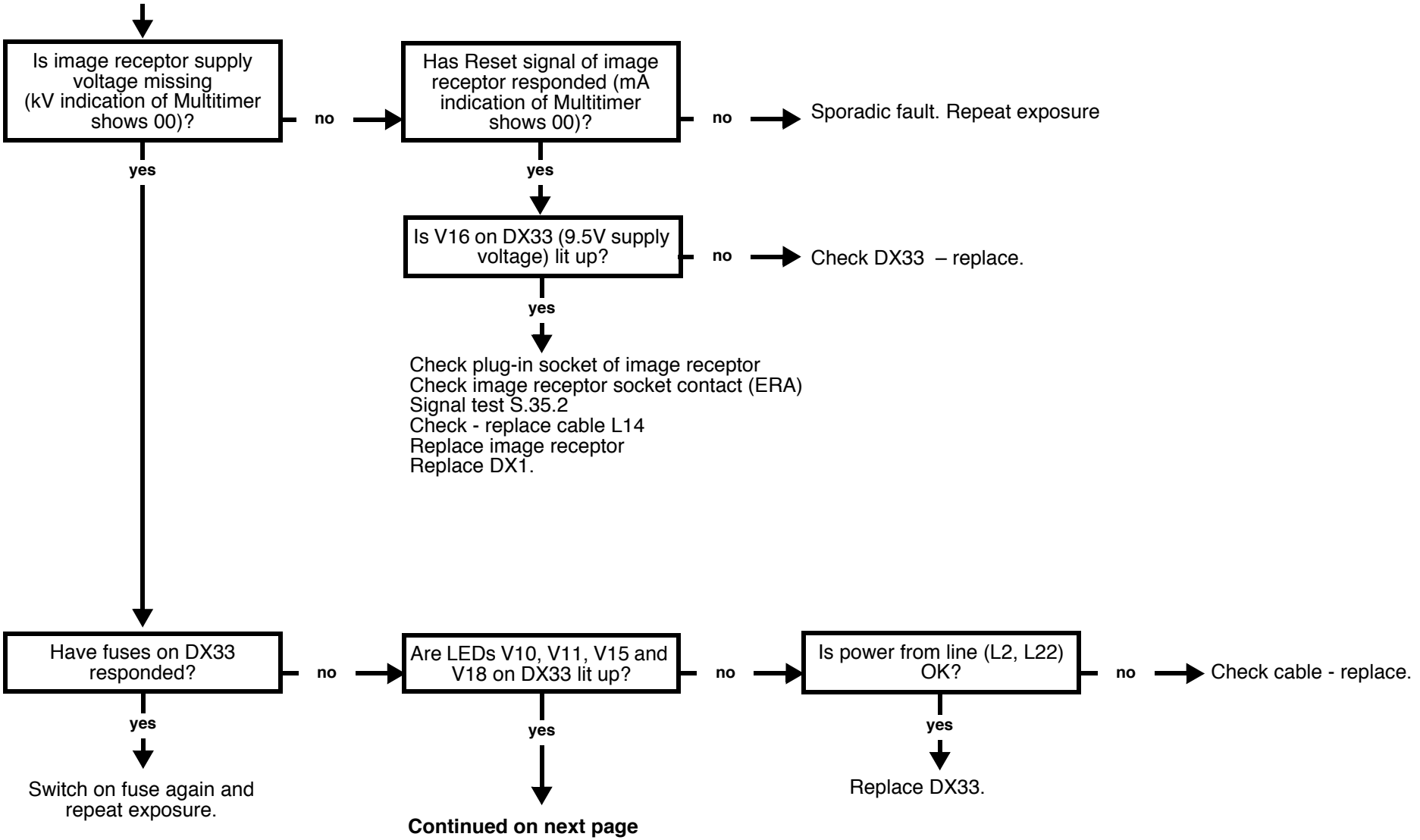
To simplify recognition of LEDs unscrew extension box and attach to side.

3.32 Correcting error of message E4 08: Aborted by SIDEXIS during radiation (with XAB)

up to serial no. 30 999 ORTHOPHOS 3 DS



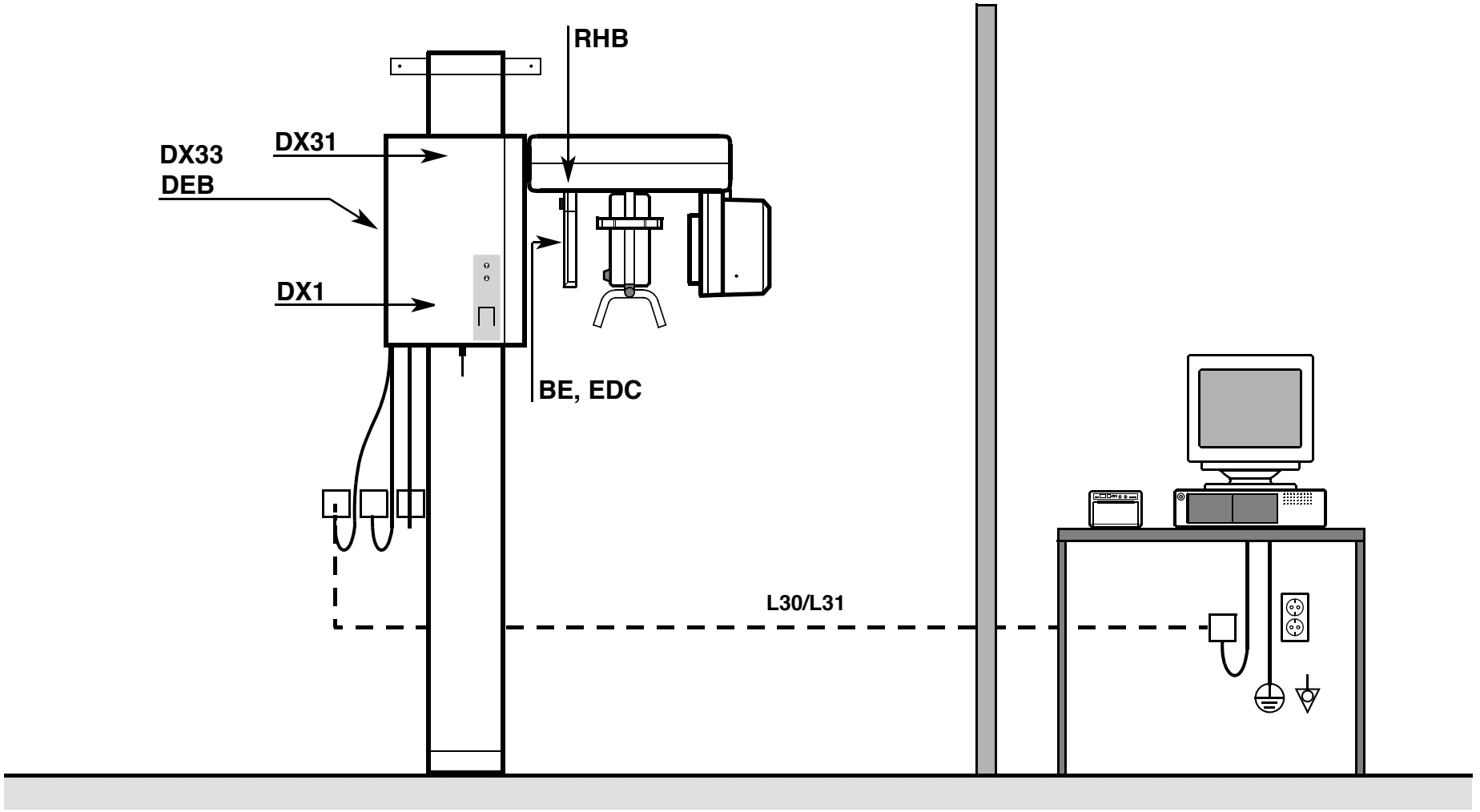
Service-Routine S.32.1 durchführen.
Switch on image receptor voltages by actuating X-Ray key.

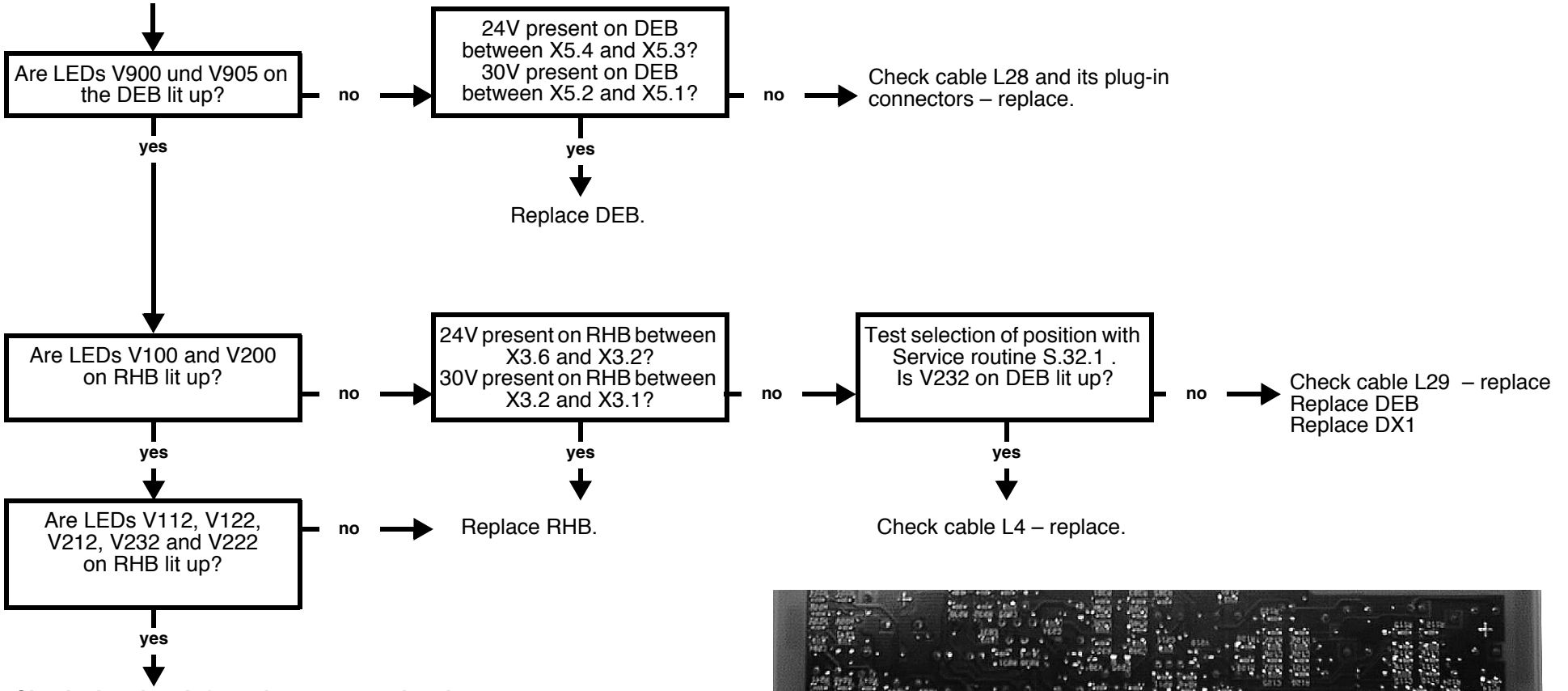

Is image receptor supply voltage missing (kV indication of Multitimer shows 00)?
no
Has Reset signal of image receptor responded (mA indication of Multitimer shows 00)?
no
Sporadic fault. Repeat exposure
yes
yes
Is V16 on DX33 (9.5V supply voltage) lit up?
no
Check DX33 – replace.
yes
Check plug-in socket of image receptor
Check image receptor socket contact (ERA)
Signal test S.35.2
Check - replace cable L14
Replace image receptor
Replace DX1.
Have fuses on DX33 responded?
no
Are LEDs V10, V11, V15 and V18 on DX33 lit up?
no
Is power from line (L2, L22) OK?
no
Check cable - replace.
yes
yes
yes
Switch on fuse again and repeat exposure.
Replace DX33.

Continued on next page

3.33 Correcting error of message E4 11: Image receptor not ready for exposure (with XOP).

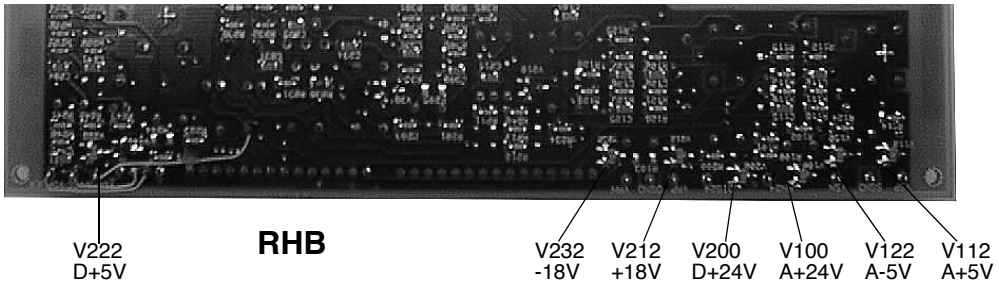
up to serial no. 30 999 ORTHOPHOS 3 DS




Are LEDs V900 und V905 on the DEB lit up?
no
24V present on DEB between X5.4 and X5.3?
30V present on DEB between X5.2 and X5.1?
no
Check cable L28 and its plug-in connectors – replace.
yes
yes
Replace DEB.
Are LEDs V100 and V200 on RHB lit up?
no
24V present on RHB between X3.6 and X3.2?
30V present on RHB between X3.2 and X3.1?
no
Test selection of position with Service routine S.32.1 .
Is V232 on DEB lit up?
no
Check cable L29 – replace
Replace DEB
Replace DX1
yes
yes
yes
Are LEDs V112, V122, V212, V232 and V222 on RHB lit up?
no
Replace RHB.
Check cable L4 – replace.
yes

Check signal path for voltage status signal
Tests and component replacement in following sequence:

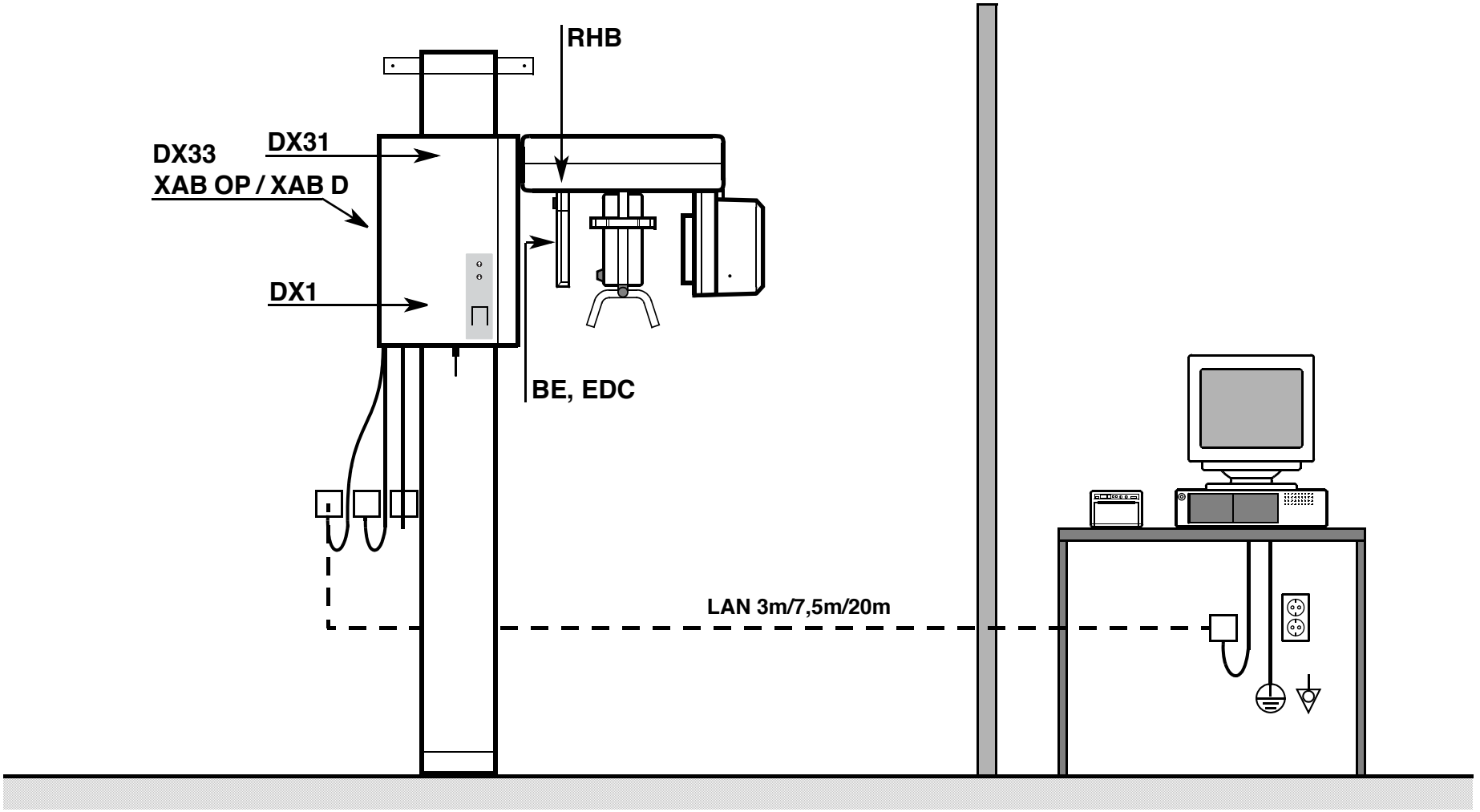
Check seating of image receptor;
Signal test S.35.2
Check socket contact of image receptor (ERA);
Check cable L29;
Check cables L30/L31 and their plug-in connectors;
DEB;
RHB;
Input test DX1 with S.13.1;
Image receptor



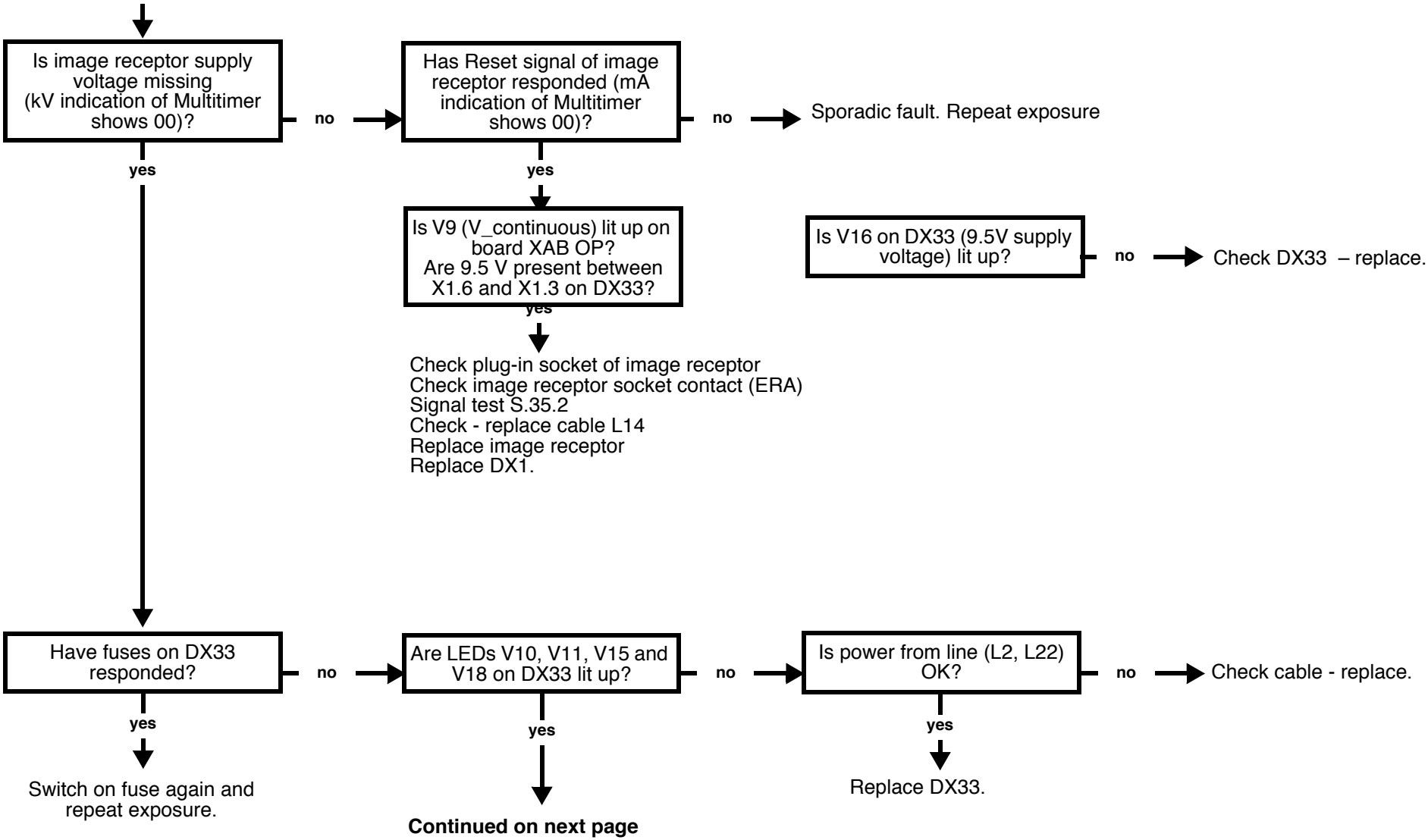
Error indication IN Pin	Signal
10 30	Active

3.33 Correcting error for message E4 11: Image receptor not ready for exposure (with XOP).

from serial no. 31 000 ORTHOPHOS 3 DS



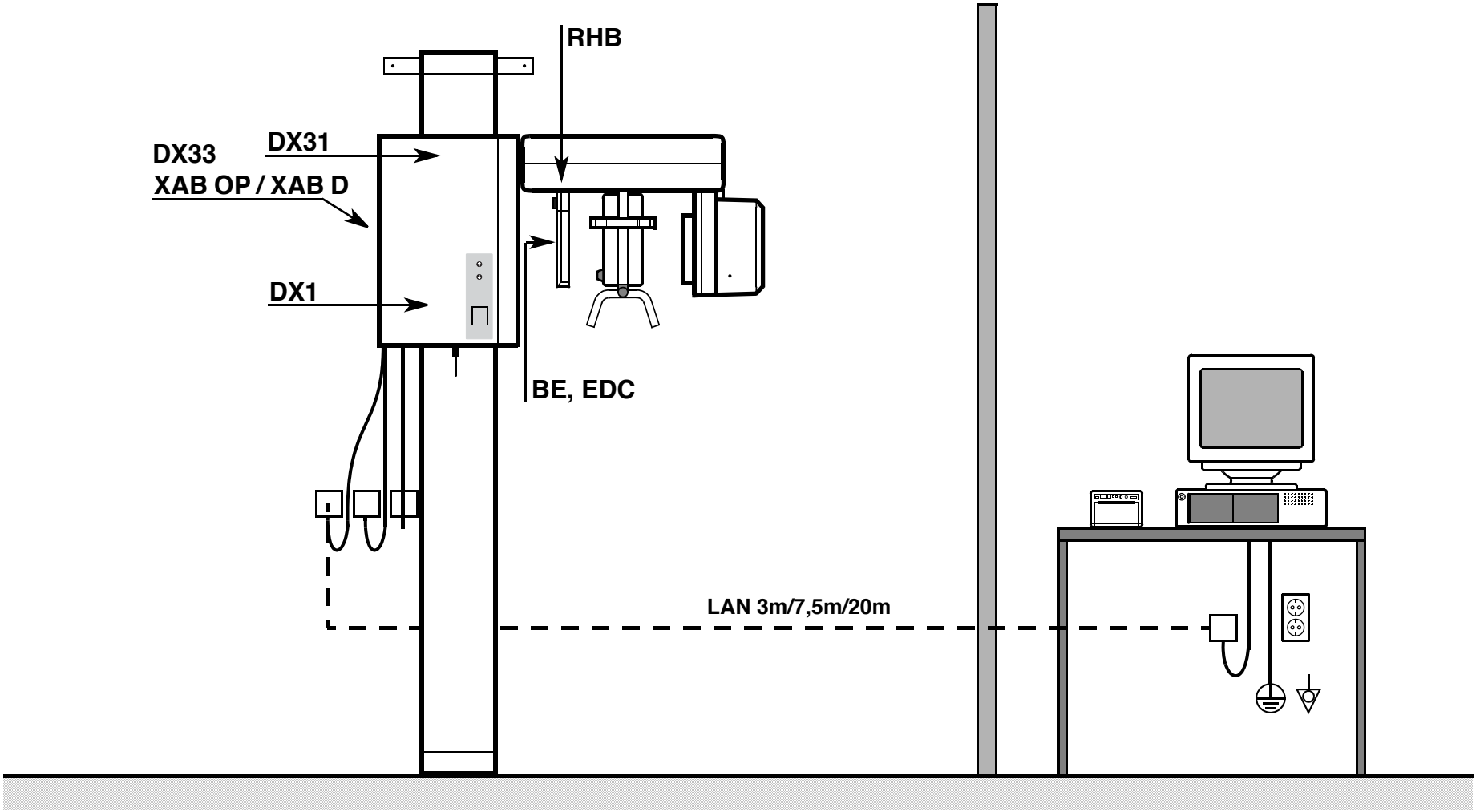
Service-Routine S.32.1 durchführen.
Switch on image receptor voltages by actuating X-Ray key.

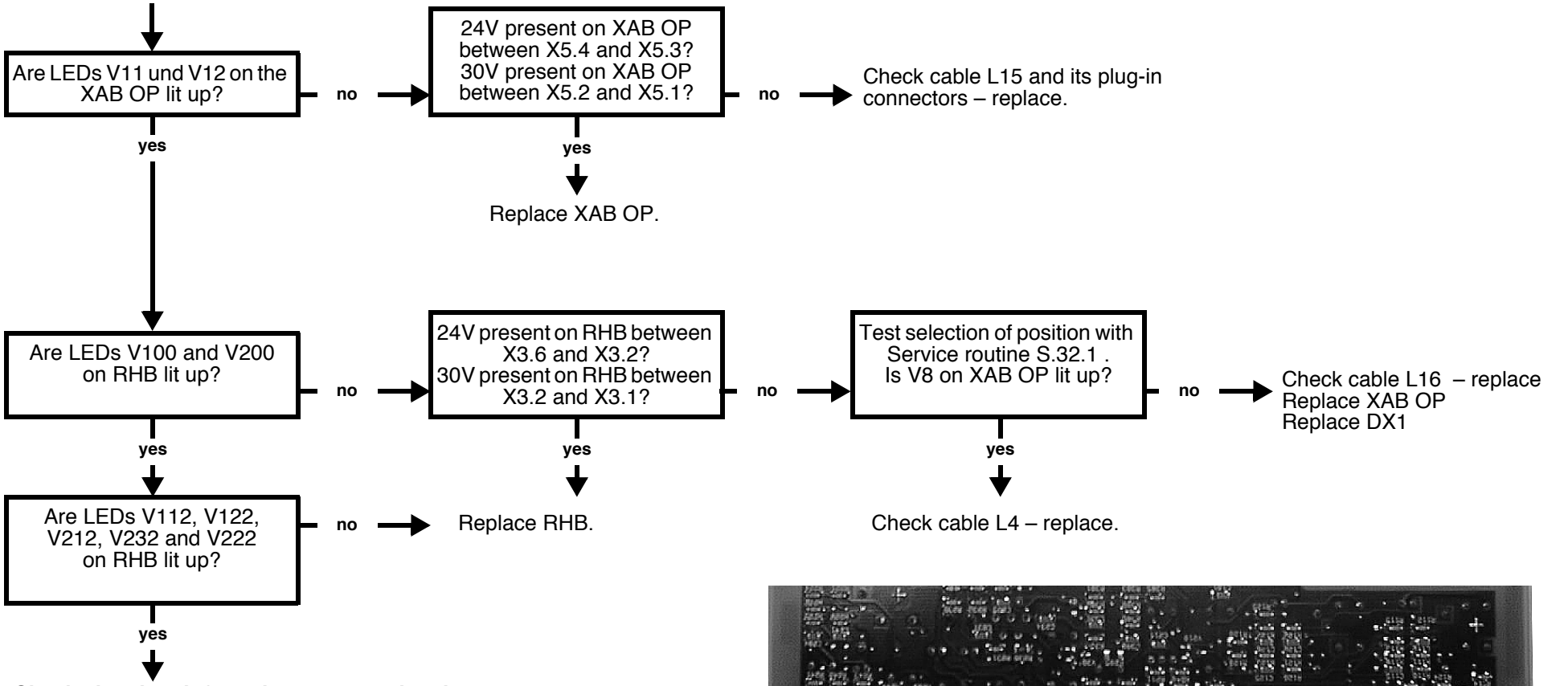

Is image receptor supply voltage missing (kV indication of Multitimer shows 00)?
no
Has Reset signal of image receptor responded (mA indication of Multitimer shows 00)?
no
Sporadic fault. Repeat exposure
yes
yes
Is V9 (V_continuous) lit up on board XAB OP? Are 9.5 V present between X1.6 and X1.3 on DX33?
Is V16 on DX33 (9.5V supply voltage) lit up?
no
Check DX33 – replace.
yes
Check plug-in socket of image receptor
Check image receptor socket contact (ERA)
Signal test S.35.2
Check - replace cable L14
Replace image receptor
Replace DX1.
Have fuses on DX33 responded?
no
Are LEDs V10, V11, V15 and V18 on DX33 lit up?
no
Is power from line (L2, L22) OK?
no
Check cable - replace.
yes
yes
yes
Switch on fuse again and repeat exposure.
Replace DX33.

Continued on next page

3.34 Correcting error for message E4 11: Image receptor not ready for exposure (with XAB)

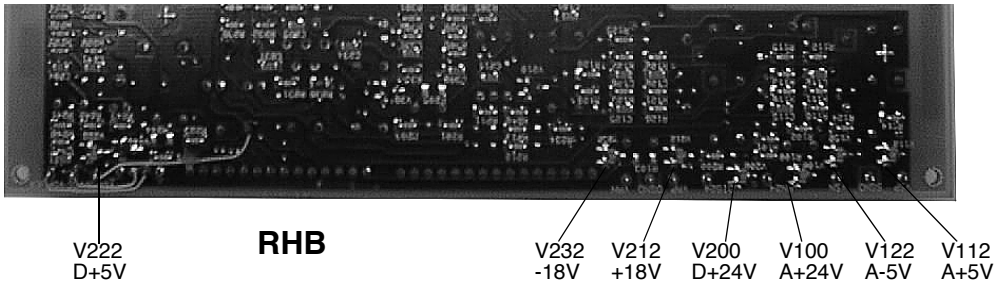
from serial no. 31 000 ORTHOPHOS 3 DS




Are LEDs V11 und V12 on the XAB OP lit up?
no
24V present on XAB OP between X5.4 and X5.3?
30V present on XAB OP between X5.2 and X5.1?
no
Check cable L15 and its plug-in connectors – replace.
yes
yes
Replace XAB OP.
Are LEDs V100 and V200 on RHB lit up?
no
24V present on RHB between X3.6 and X3.2?
30V present on RHB between X3.2 and X3.1?
no
Test selection of position with Service routine S.32.1 .
Is V8 on XAB OP lit up?
no
Check cable L16 – replace
Replace XAB OP
Replace DX1
yes
yes
yes
Are LEDs V112, V122, V212, V232 and V222 on RHB lit up?
no
Replace RHB.
Check cable L4 – replace.
yes

Check signal path for voltage status signal
Tests and component replacement in following sequence:

Check seating of image receptor;
Signal test S.35.2
Check socket contact of image receptor (ERA);
Check cable L29;
XAB OP;
RHB;
Input test DX1 with S.13.1;
Image receptor



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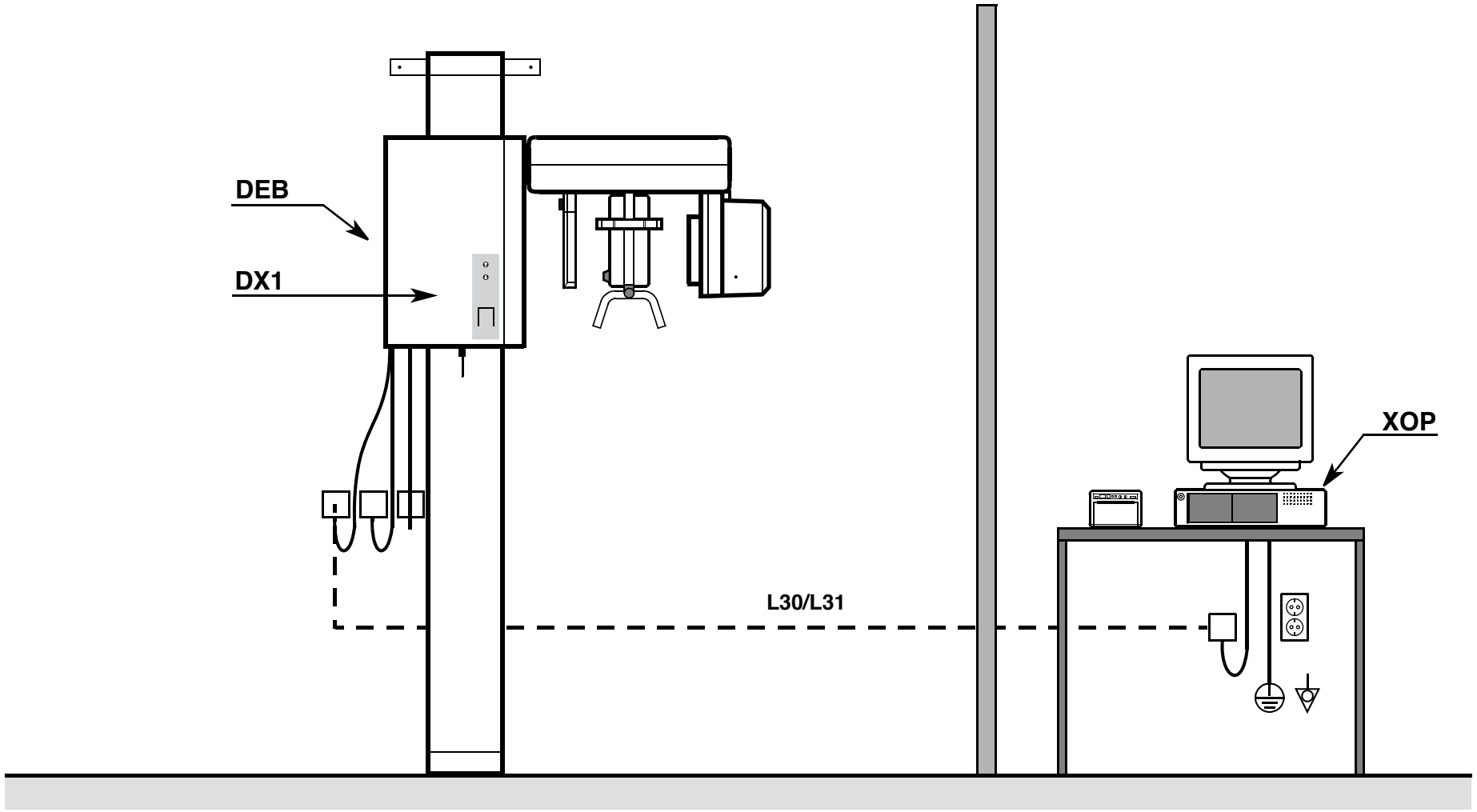
Error indication IN Pin	Signal
10 30	Active

3.34 Correcting error of message E4 11: Image receptor not ready for exposure (with XAB)

up to serial no. 30 999 ORTHOPHOS 3 DS



Deselect exposure readiness from SIDEXIS.
Active signal is then switched off!
Is LED V670 for *Active* lit up on DEB?

no →

Select Service routine S.35.1 and observe mA indication.

01 *Active* signal recognized by DX1.
00 *Active* signal not recognized by DX1.

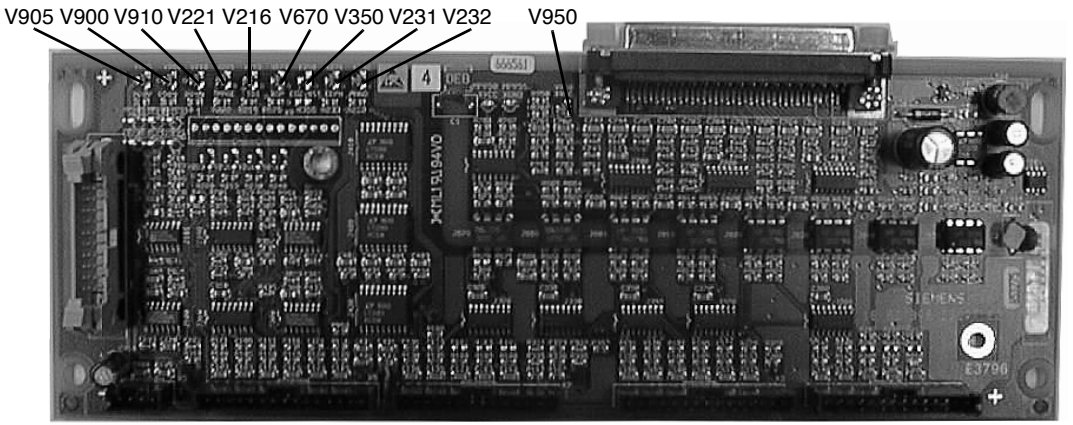
Pull out plug X25 on DX1.
Is *Active* signal still recognized?

no → Check cable L29 – replace
If necessary replace DEB board

yes ↓ Check cables L31/L3 – replace
If necessary replace XOP
If necessary replace DEB

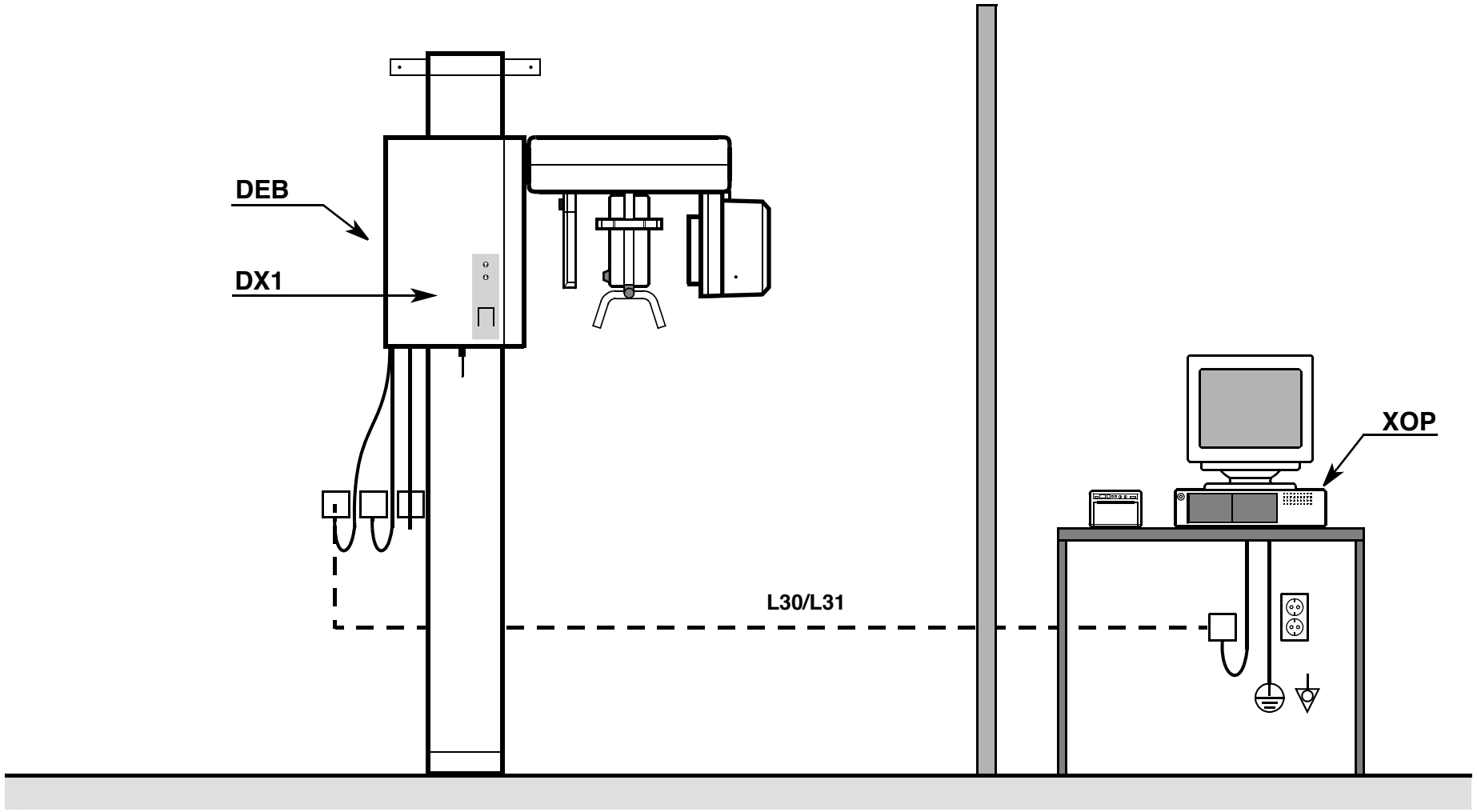
yes ↓ Replace DX1 and adjust,
☞ see page 4 - 31

DEB



3.35 Correcting error of message E4 16: Active signal present when switching ON (with XOP).

from serial no. 31 000 ORTHOPHOS 3 DS



Deselect exposure readiness from SIDEXIS.
Active signal is then switched off!
Is LED V13 for *Active* lit up on XAB OP?

no →

Select Service routine S.35.1 and observe mA indication.

01 *Active* signal recognized by DX1.
00 *Active* signal not recognized by DX1.

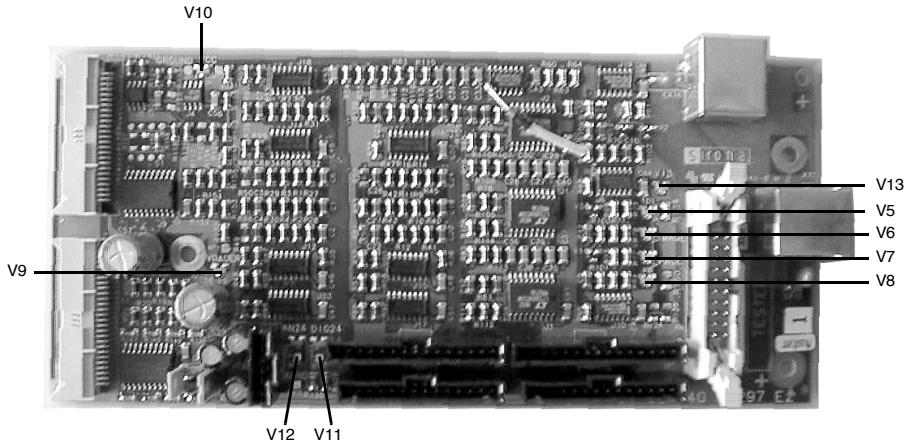
Pull out plug X25 on DX1.
Is *Active* signal still recognized?

no → Check cable L16 – replace
If necessary replace XAB OP board

yes → Replace DX1 and perform setting routine, see page 4 - 31

yes → If necessary replace XAB OP
If necessary replace XAB D

XAB OP



3.36 Correcting error of message E4 16: Active signal present when switching ON (with XAB)

sirona
The Dental Company

4 Checks and Adjustments

Checks and Adjustments

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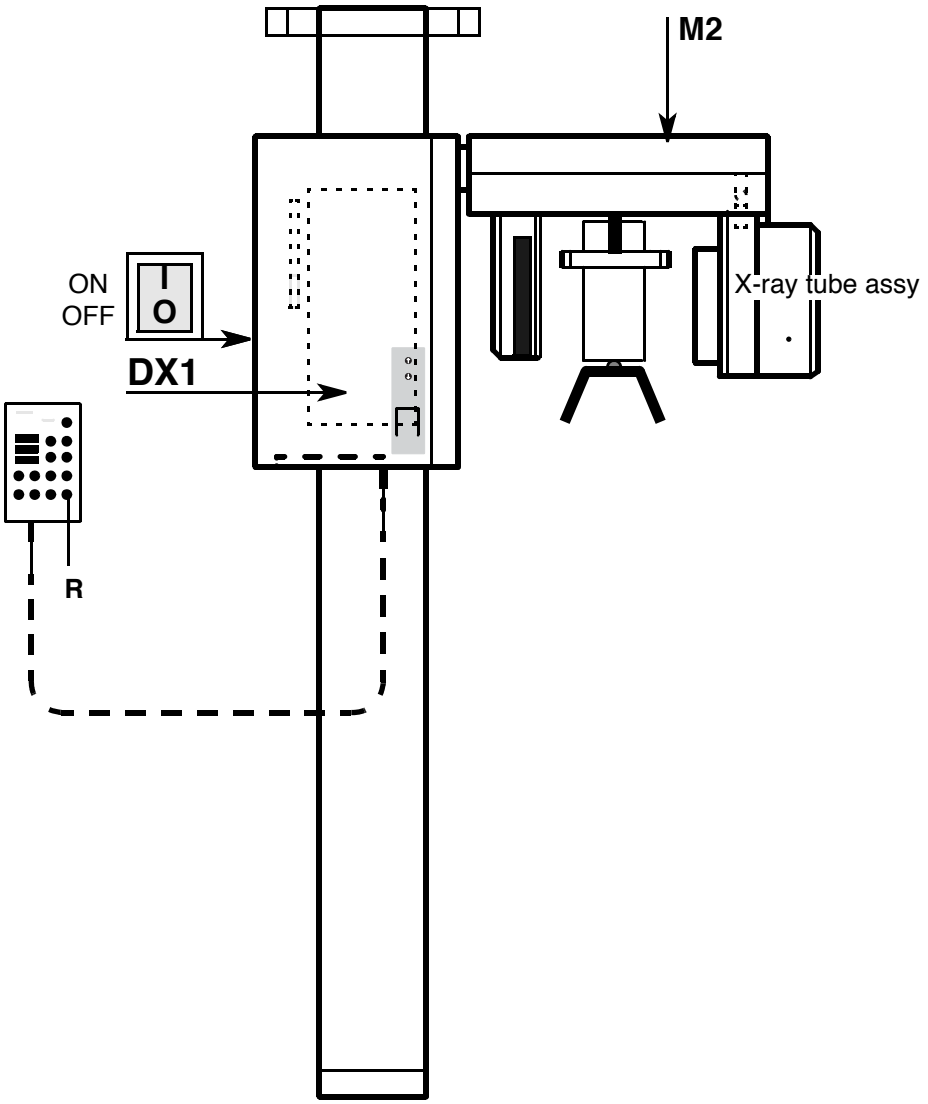
4.11 Checking and adjusting the light localizers ..... 4 - 33


M2
ON
OFF
I
O
DX1
X-ray tube assy
R

- Check once more whether the following points were observed when taking the phantom radiograph:
  - Needle phantom fully inserted.
  - Temple support fully closed.
  - Diaphragm wheel set to Panorama diaphragm 10 or 1.
  - Program P1 and lowest kV/mA preselected on Multitimer.
  - ORTHOPHOS 3 DS: SIDEXIS exposure readiness set for quality test exposure.
  - ORTHOPHOS 3: cassette inserted.

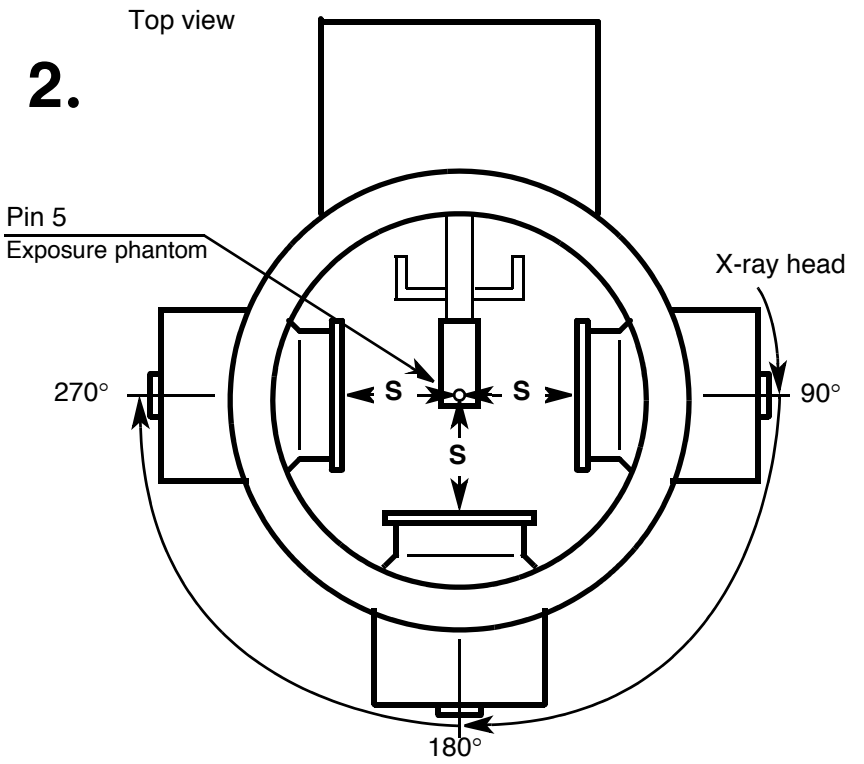
  Readjustment of the actuators is required if the specified pin distances on the phantom radiograph are not within the specified tolerance (see figure on next page).

1. **Basic settings of actuators M2:**
   Unscrew the cover from the carriage. Switch the unit on.
   The X-ray tube assembly is in the symmetry position.
2. **Check the basic setting of the bite block**
   Move the X-ray tube assembly by hand to the 90° position and measure the symmetry distance S between the primary diaphragm and pin 5 (see Figure on the right).
   Set the X-ray tube assembly manually to the 180° and 270° positions and measure the symmetry distance S.

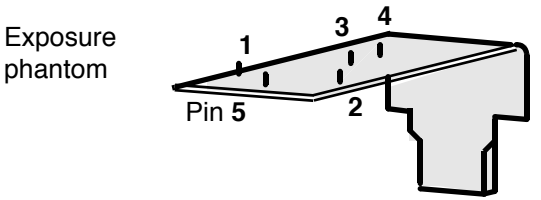
- All three symmetry distances **S** must be the same.
  Maximum permissible asymmetry: **±0.5 mm.**

3. **Position of the X-ray beam**
   After performing the basic setting, you must check the position of the X-ray beam.
   Proceed according to section
   'Checking and adjusting the X-ray beam for Panorama exposure', ☝ see page 4 - 13.

Continued on next page

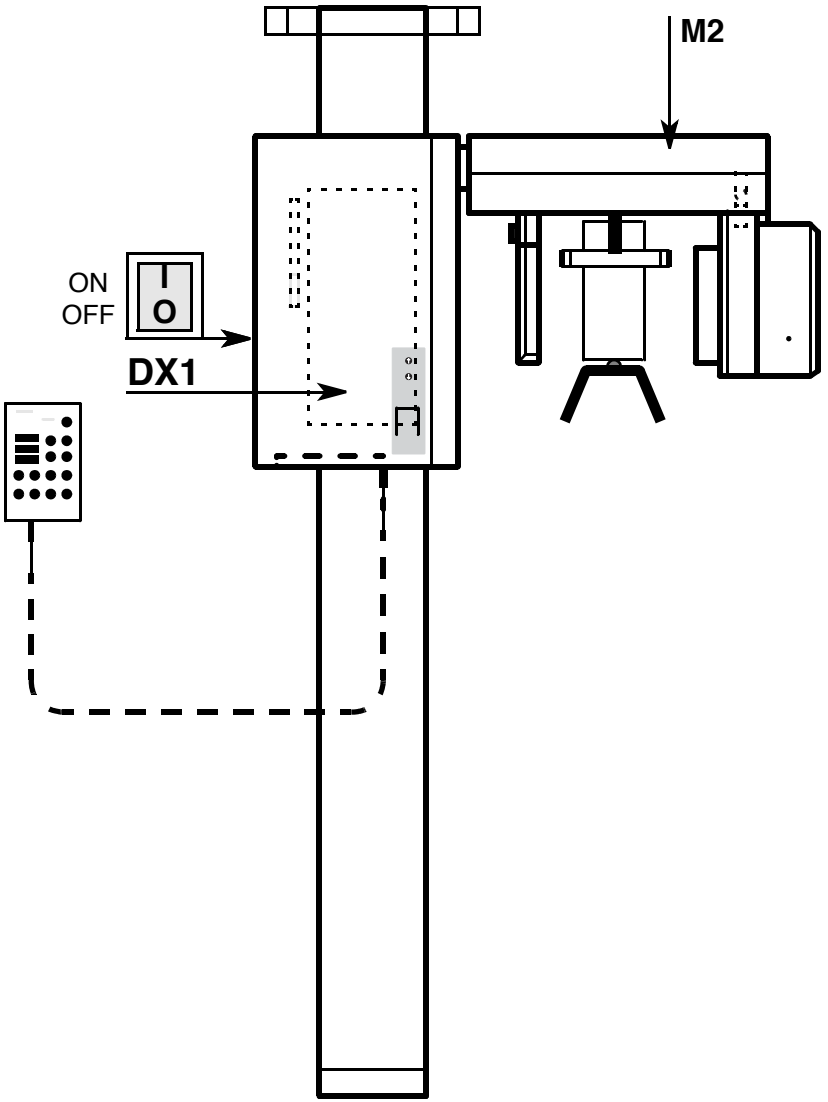


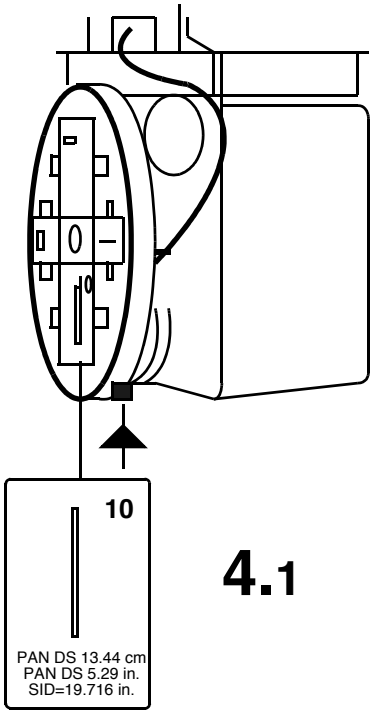
S= measured distance ± 0.5mm



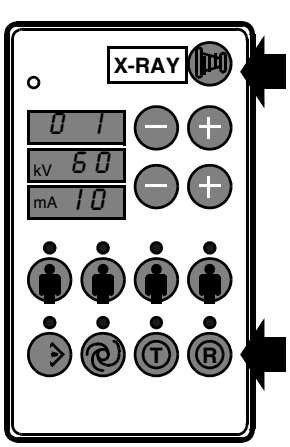
4.1 Phantom radiograph — Adjusting actuator M2

4. ORTHOPHOS 3 DS





4.1



4.4

4.2

4.3 ORTHOPHOS 3 DS Menu in SIDEXIS

Services →
Constancy check →
X-ray operators →
Icons XC XP →
Service exposure →
Quality test exposure (4)

Continued

4. ORTHOPHOS 3 DS (digital)

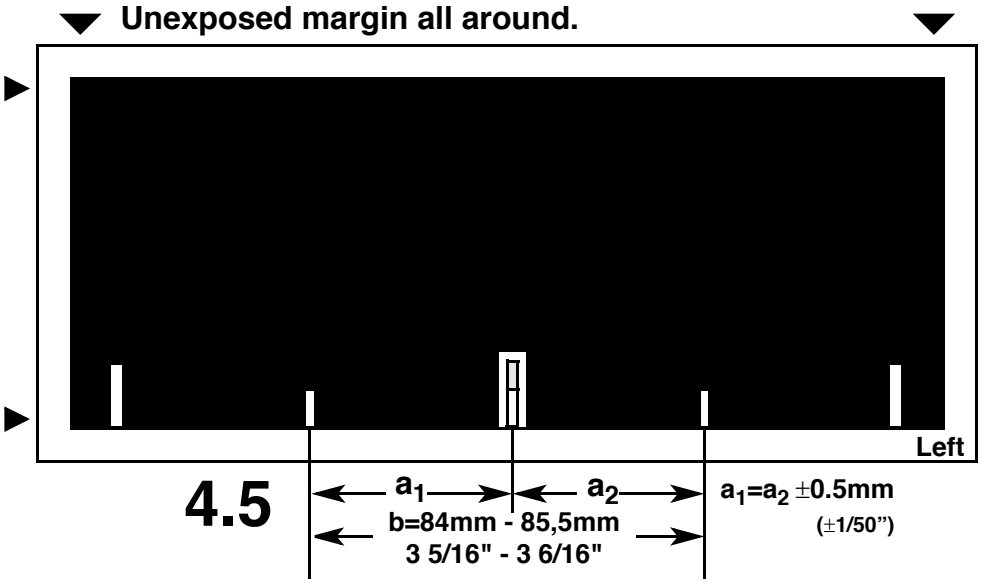
4.1 Phantom radiograph: (X-ray beam must be adjusted)

4.2 Press Return key R. The X-ray tube assembly travels to the start position.

4.3 In the **Services** menu click on **Constancy check**
Select **X-ray operators**, click icons **XC XP**
Select **Service exposure**
Activate **Quality test exposure (4)** .

4.4 CAUTION: RADIATION!
Release and exposure for one complete revolution of the rotating part.

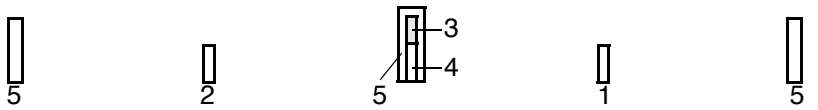
4.5 Evaluate the image on the screen.
Measure the line spacing with **Length measurement** in the **Analysis** menu.
Use the mouse cursor to determine the start point for length measurement and drag the cursor to the end point with the left mouse button pressed.



5. ORTHOPHOS 3 (conventional film)

5.1 Prepare the phantom radiograph

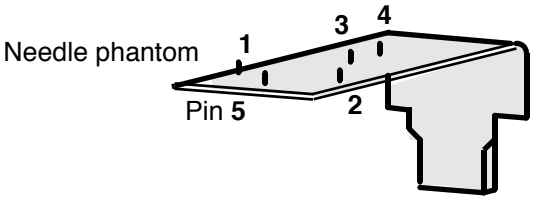
- Set the diaphragm wheel to diaphragm **1**. With adhesive tape attach a 0.4 mm thick lead strip to the slot mark (contrast enhancement).
  NOTE: Use the 0.1 mm thick lead screen from an intraoral film and fold it twice in the longitudinal direction.
- Insert the phantom supplied to its end position.
- Place a non-exposed film in the cassette.
- Load the cassette in the cassette holder (see Operating Instructions).
- Swivel the cassette holder into position.
- Turn the unit on. Wait for the unit to execute the self-adjustment.

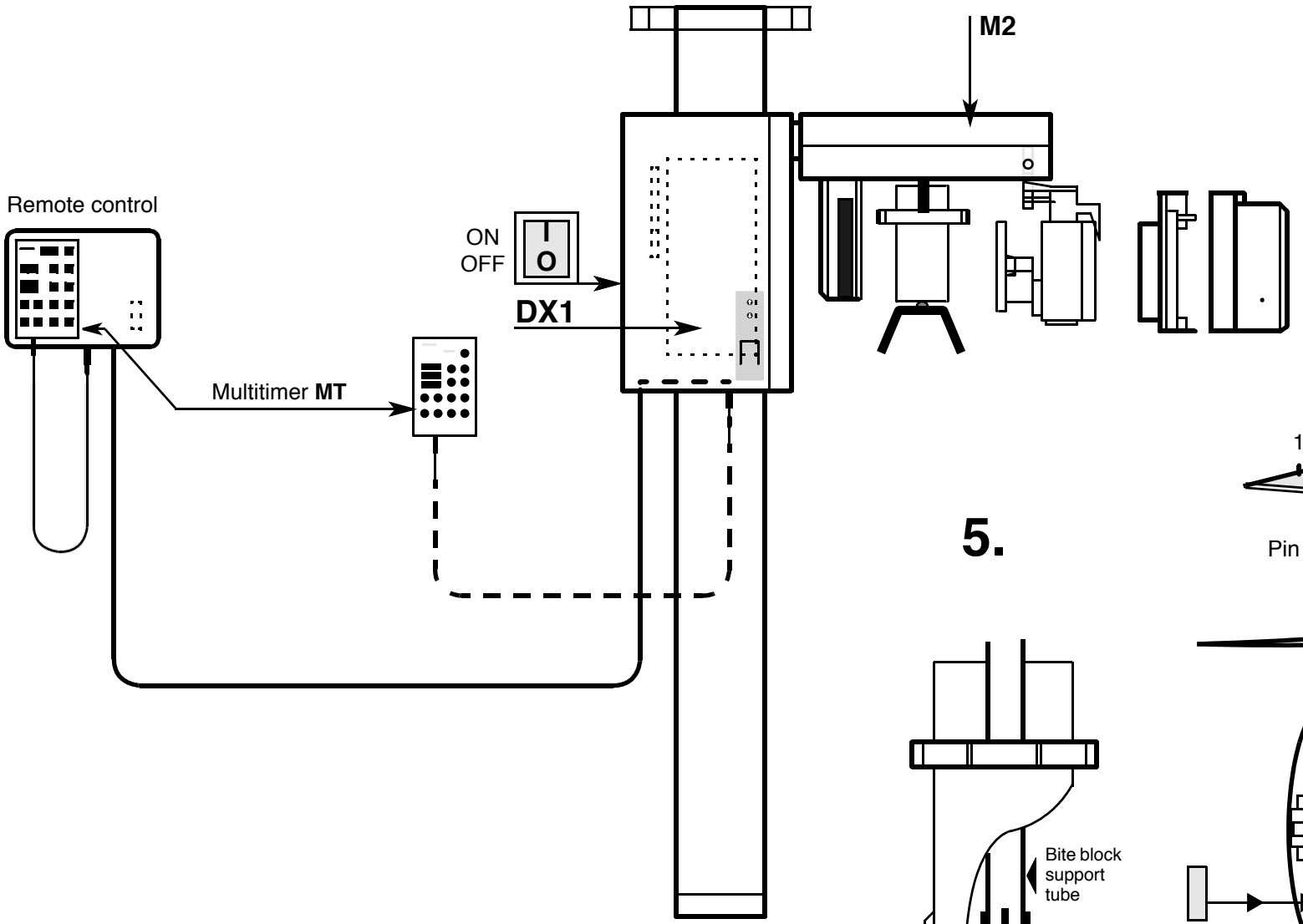


5.2 Exposure "through the center"
Move the X-ray tube assembly by hand to the **180°** position.
Select **Service routine S.02, test step 01** on the Multitimer
(see section **'Service routine S.02'**).
At the Multitimer select 0.50 sec exposure time with the upper – + keys
select 60kV/10mA with the lower – + keys

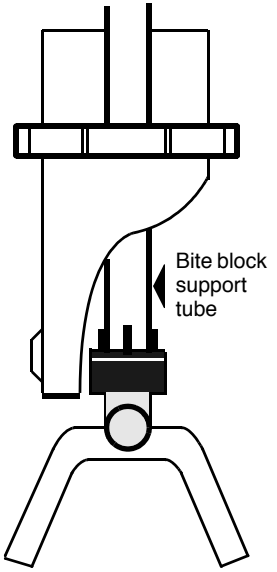
Release an exposure. **CAUTION: RADIATION!**

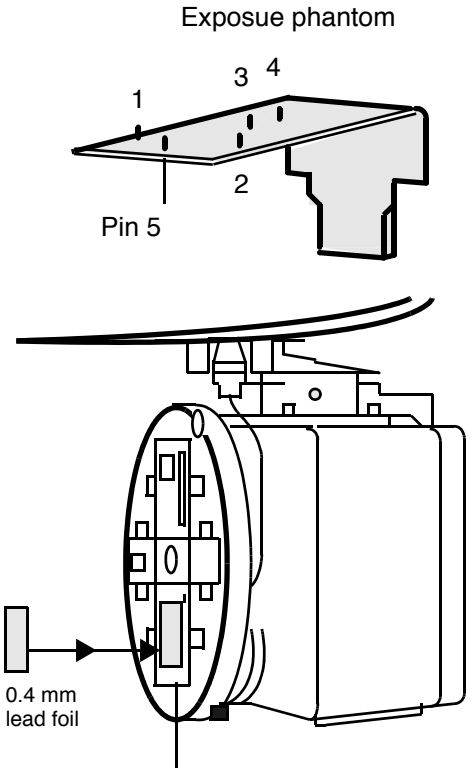
Continued on next page




M2
Remote control
ON
OFF
I
O
DX1
Multitimer **MT**

5.


Bite block
support
tube


Exposue phantom
1
2
3
4
Pin 5
0.4 mm
lead foil

Continued

5.3 Panorama radiograph

- Remove the lead strip from diaphragm 1.
- Press the Return key **R** on the cassette holder.
  The X-ray tube assembly travels to the start position.
- Deselect kV increase. (Press Memory key, LED above Memory key flashes.
  Press Program Display + key. O 1 appears in display.
- Select program P1 and the lowest kV setting.
- Release an exposure for one complete rotation.
  CAUTION: RADIATION!

5.4 Develop and evaluate the film.
Watch for the unexposed margin.
Pin 5 must appear within the exposed strip.

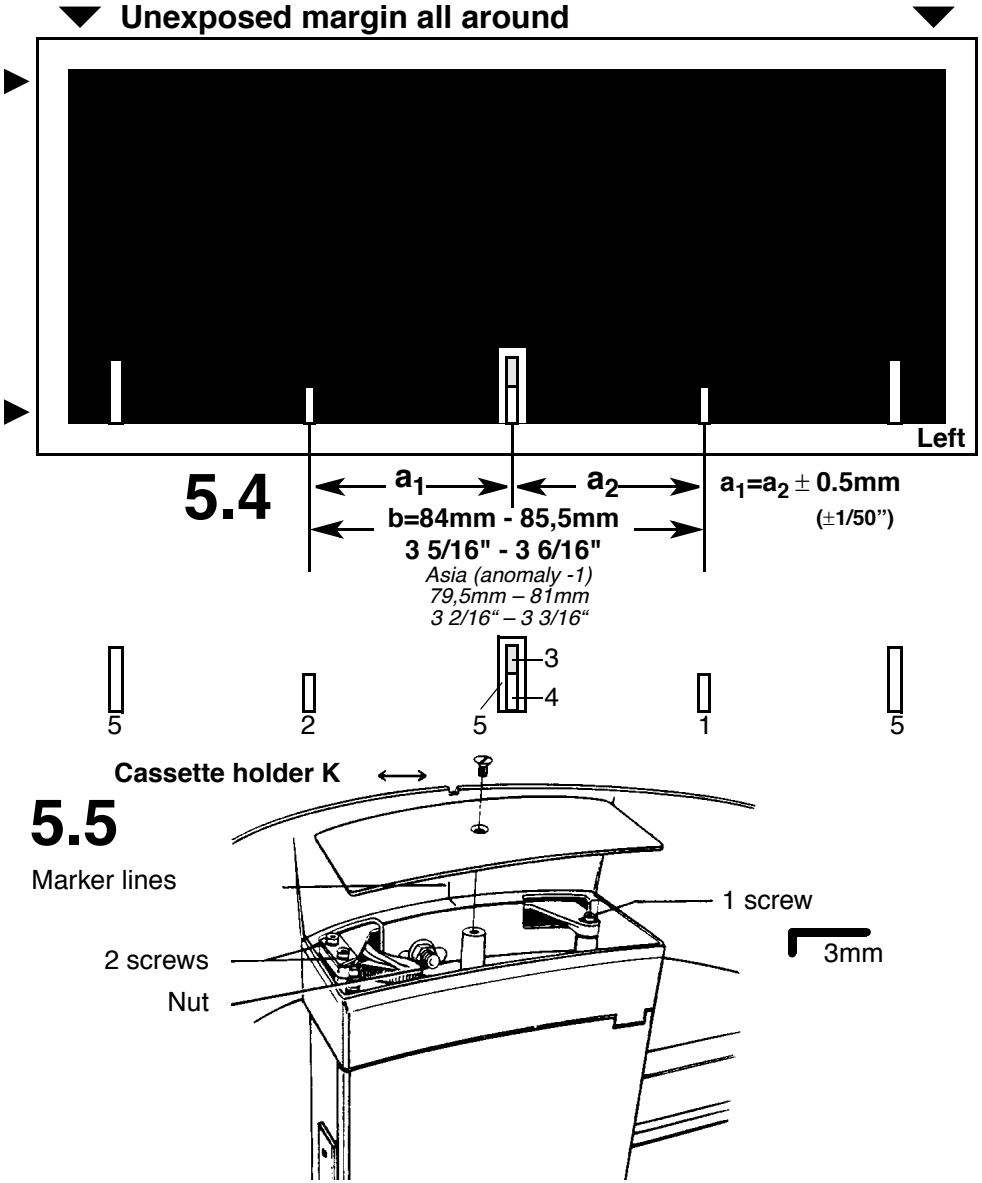
5.5 Otherwise, adjust the cassette holder K as follows:

- Unscrew the cover.
- Attach two line markings.
- Loosen the nut and the three screws.
- Shift the cassette holder to the required position.
  Note: 1 mm deviation on the film requires 1 mm shift of cassette holder K.
- Pin appears too far left on the film: Move K to the right → .
- Pin appears too far right on the film: Move K to the left ← .

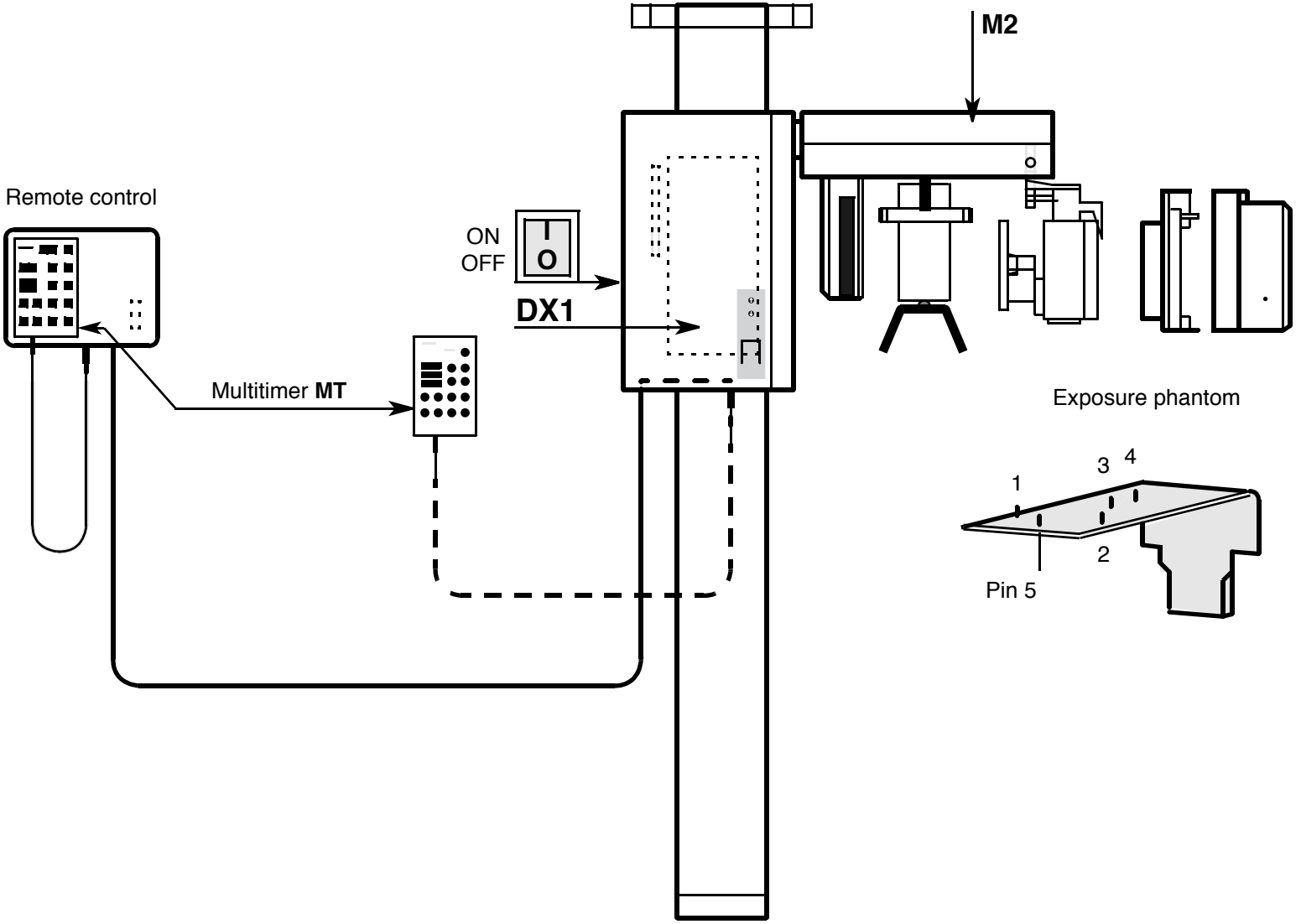
Recheck: Repeat the phantom radiograph as described above.
Pin 5 must appear within the exposed strip.

Panorama radiograph
Evaluate the unexposed margin around the edge.
Line distances **b** and a_1 / a_2 must be within the specified tolerance.

Continued on next page



4.1 Phantom radiograph - Adjusting actuator M2


M2
Remote control
ON
OFF
I
O
DX1
Multitimer **MT**
Exposure phantom
1
2
3
4
Pin 5

Continued

6. ORTHOPHOS 3 DS and ORTHOPHOS 3

6.1 Correction by fine adjustment of actuator M2

Rule for spacings a_1 and a_2 :

1mm difference between a1 and a2 on the film corresponds to 0.3mm maladjustment of actuators (~ 1/4 wrench turn).

If $a_1 < a_2$: shorter pin 4 is imaged to right of pin 3 (Figure).
Hold sleeve **B** with wrench and loosen counternut **A**.
Turn sleeve **B** in clockwise direction and fix with counternut **A**.

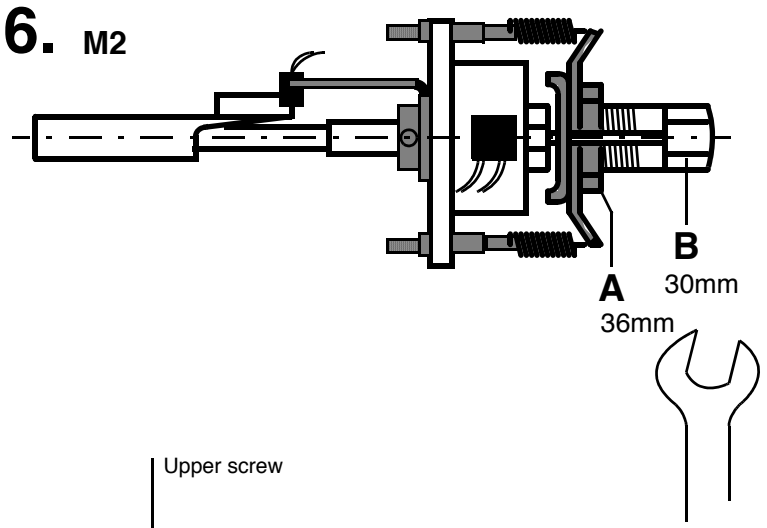
If $a_1 > a_2$: shorter pin 4 is imaged to left of pin 3.
Hold sleeve **B** with wrench and loosen counternut **A**.
Turn sleeve **B** in counterclockwise direction and fix with counternut **A**.

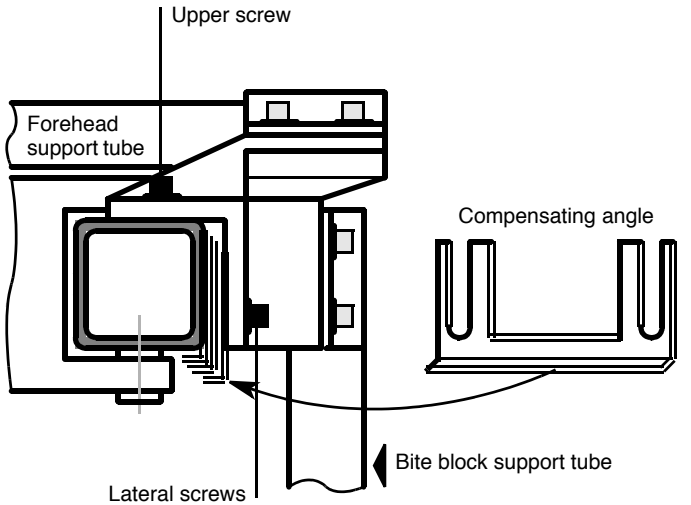
Rule for spacing b:

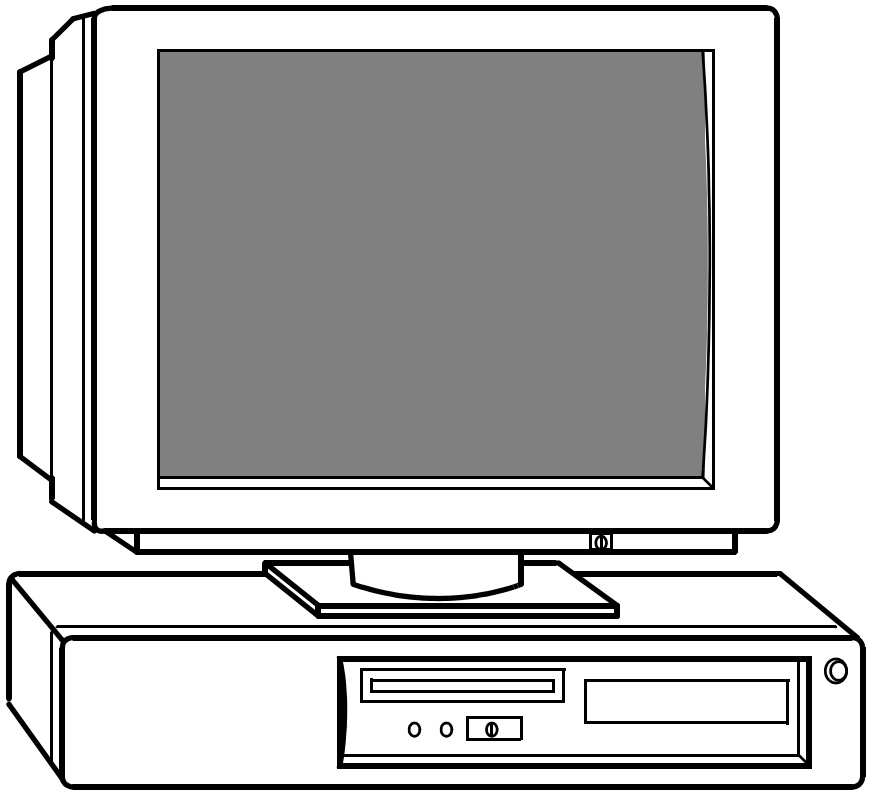
1mm change in spacing on the image/film corresponds to 0.5mm compensation angle.
2mm change in spacing on the image/film correspond to 1mm compensation angle.
Order nos. 33 10 609 compensation angle 0.5mm, 33 10 344 compensation angle 1mm.

Maximum exceeded: add angle
Minimum not reached: remove angle
NOTE: First tighten the lateral screws and then the upper screws.

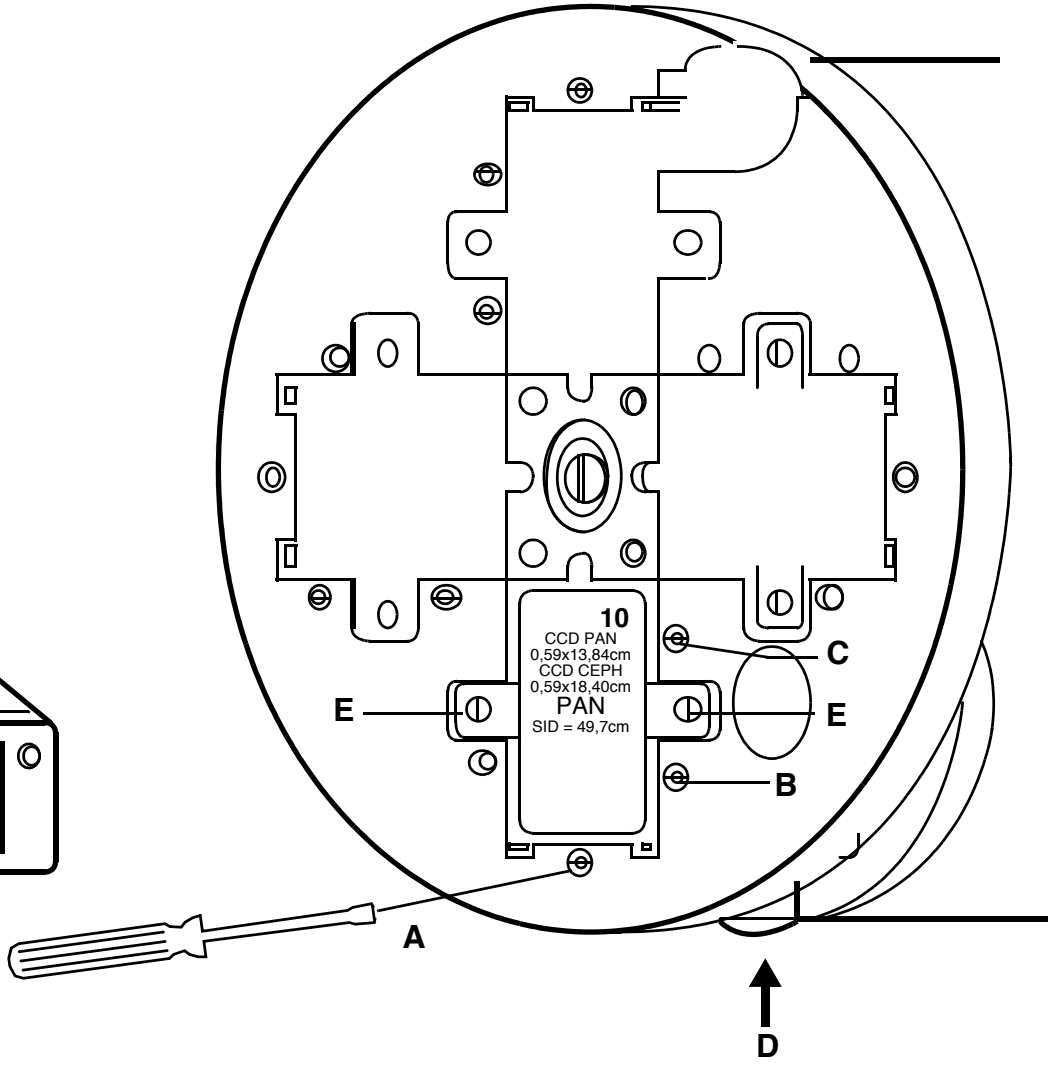
Check: Repeat a Panorama exposure (with new film).







1.

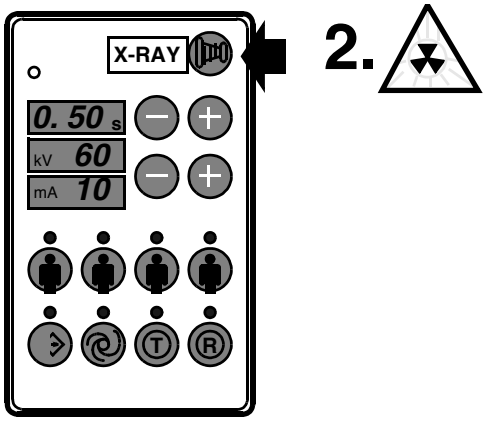

10
CCD PAN
0,59x13,84cm
CCD CEPH
0,59x18,40cm
PAN
SID = 49,7cm
C
E
E
B
A
D

Bei ORTHOPHOS 3 DS

- Adjust primary diaphragms 10 on the diaphragm wheel.
- Press locking button **D** to adjust the diaphragm wheel.
  Radiation is generated only if button **D** is correctly engaged.

1. Establish exposure readiness:
in the **Service** menu click on **Constancy check**
Select **X-ray operators**, click icons **XC XP**
Service password (see SIDEXIS Service Manual)
Select **Service exposure**
Activate **Diaphragm adjustment (3)** .

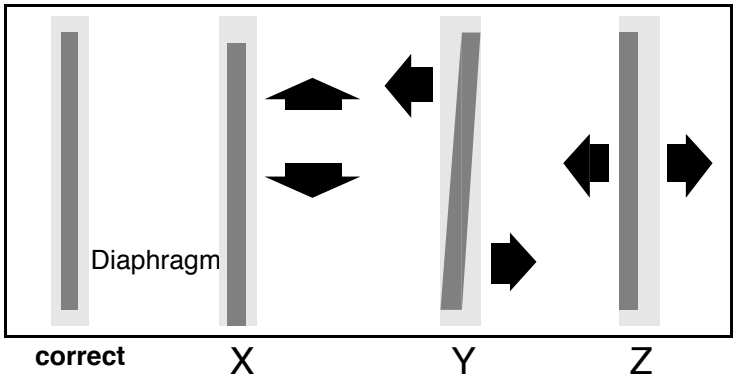
2. Generate RADIATION.
The beam must appear (horizontally and vertically) in the center of the diaphragm display on the screen).
NOTE: If the beam is not visible on the screen:
Set exposure readiness, darken the room, set radiation time = 4.0 sec,
90kV/12mA, release **RADIATION**, observe the position of the beam on the fluorescent screen and make a coarse adjustment.



X "High-Low" beam correction
Loosen two screws **E** by one turn each.
Make the beam correction with the screw (eccentrics).
Retighten screws **E**.

Y "Vertical" beam correction and

Z 'Right-left' beam correction
Loosen two screws **E** by one turn each.
Make the beam correction with the screw (eccentrics).
Retighten screws **E**.

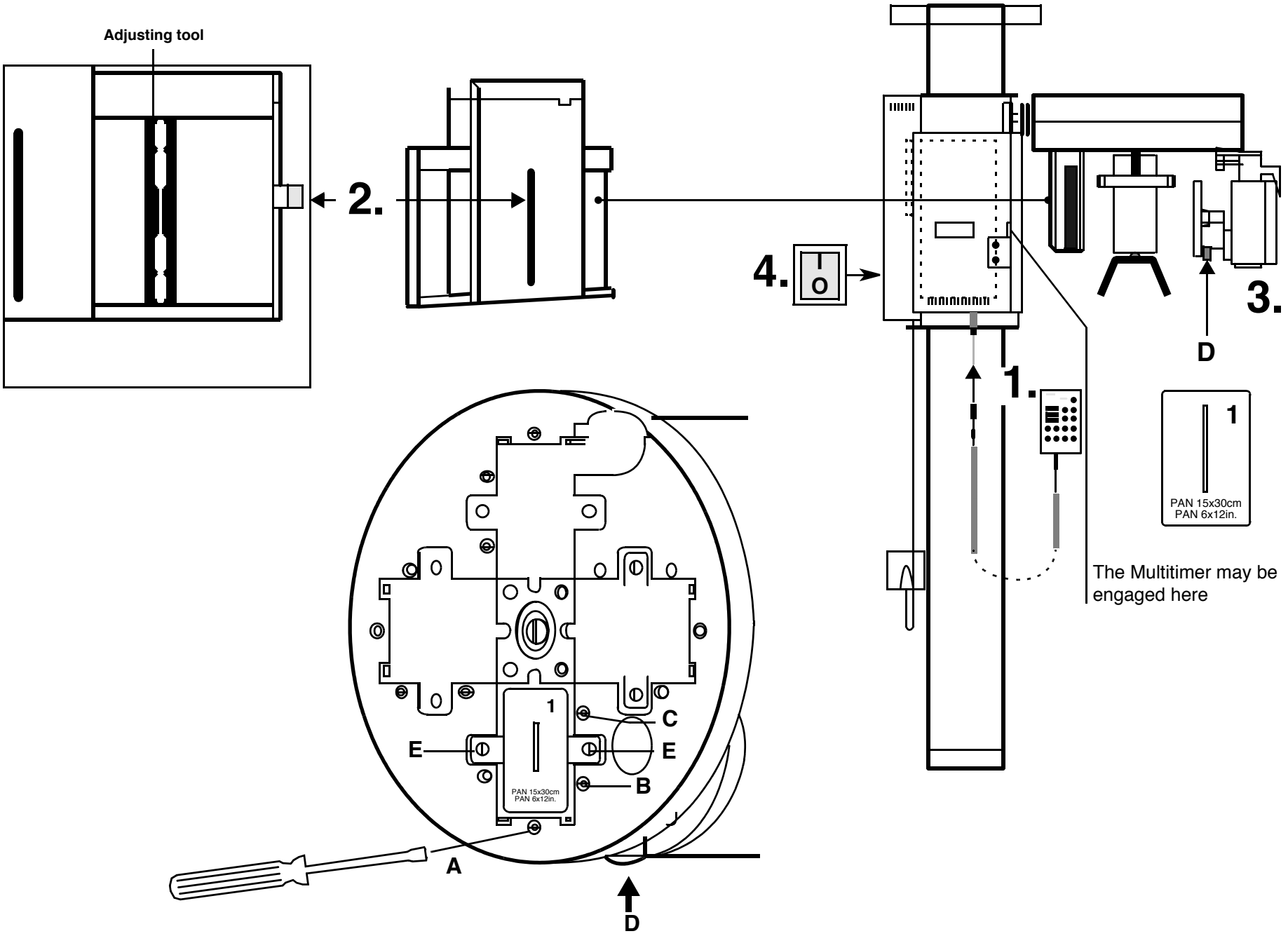


Final check of the beam position is done in section **Phantom radiograph,** see page 4 - 5.

- Close diaphragm displays
  ([Strg]+[F4]).

Continued on next page

4.2 Checking and adjusting the X-ray beam for Panorama radiography


Adjusting tool
2.
4.
3.
D
1.
1
PAN 15x30cm
PAN 6x12in.
The Multitimer may be engaged here
1
C
E
E
B
PAN 15x30cm
PAN 6x12in.
A
D

Bei ORTHOPHOS 3

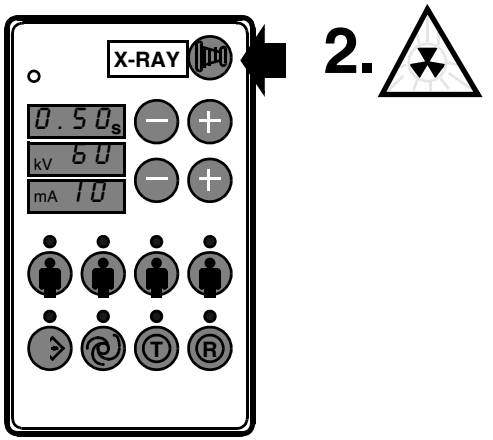
1. Insert the **adjusting tool** vertically into the cassette carriage and slide it behind the secondary diaphragm.

   Actuate main switch **S1** on the rear panel of the carriage.
   Several radiographic parameters light up on the Multitimer (see Operating Instructions).

   Darken the room.

- Set primary diaphragm 1 on diaphragm wheel (on Pan unit fixed setting, adjustable only on ORTHOPHOS 3 Ceph).
- Press locking button **D** to adjust the diaphragm wheel.
  Radiation will be generated only if button **D** is correctly engaged.When adjusting the primary diaphragm, position the beam to the indicated marks.
- Select Service routine S.01.

2. **Generate RADIATION.**
   Release radiation only for the time necessary to recognize the beam position.

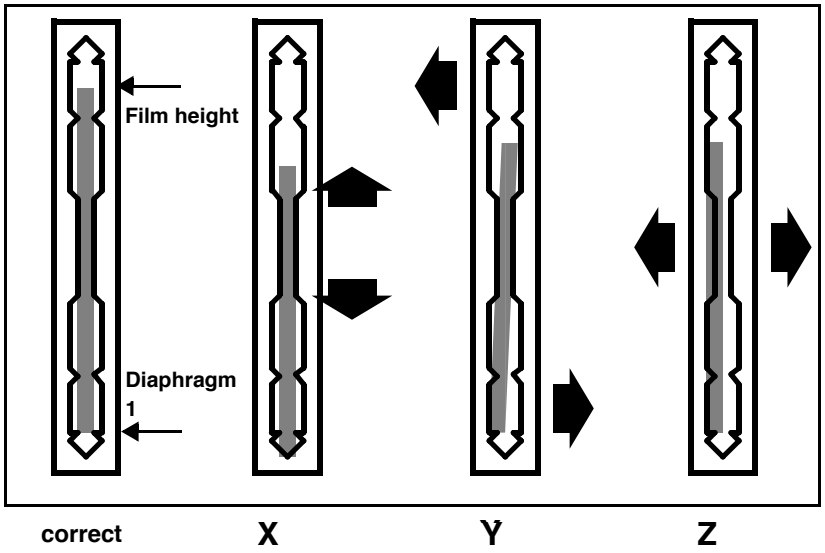


X "High-Low" beam correction
Loosen two screws **E** by one turn each.
Make the beam correction with screw A (eccentric).
Retighten screw **E**.

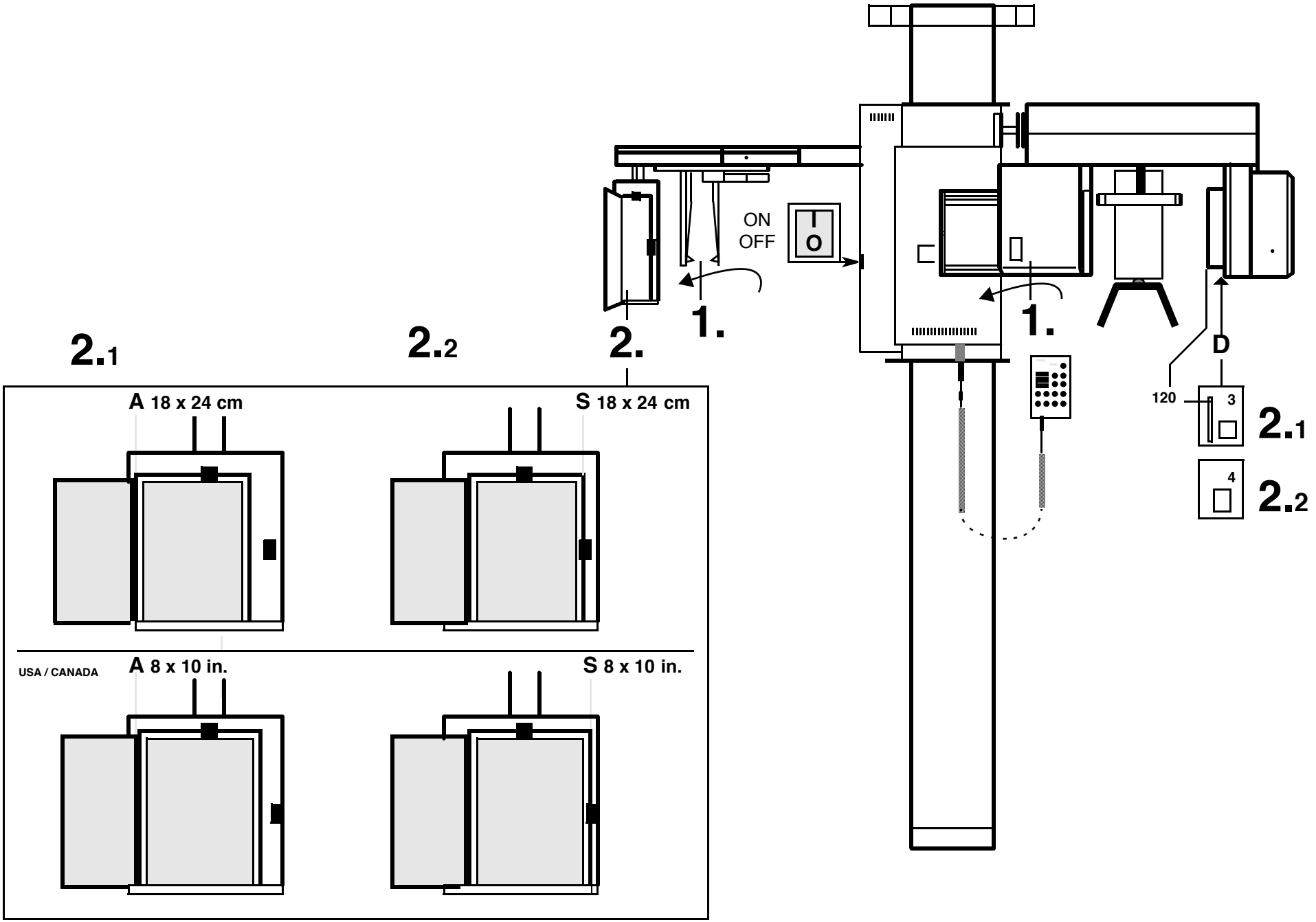
Y "Vertical" beam correction and

Z "Right-Left" beam correction
Loosen two screws E one turn each.
Make the beam correction with screws B and C (eccentrics).
Retighten screws E.

- Final check of the beam position is done in section **Phantom radiograph,** see page 4 - 5.



4.2 Checking and adjusting the X-ray beam for Panorama radiography


ON
OFF
I
O
1.
1.
2.
D
120
3
4
2.1
2.2
2.1
2.2
A 18 x 24 cm
S 18 x 24 cm
USA / CANADA
A 8 x 10 in.
S 8 x 10 in.

1. Open ear olives and swivel nose support up.
   Move the ear olive holder and cassette holder out of the X-ray beam path.
   Switch unit ON. Wait for self-adjustment of the unit..
2. **Two checks / adjustments must be made:**

2.1 Check A (Asymmetrical)
Set diaphragm **3** on wheel (press button **D** and turn wheel).
Set soft-tissue filter in position **120**.
Insert opened cassette vertically and make contact to the lefthand stop.

2.2 Check S (Symmetrical)
Set diaphragm 4 on wheel.
Insert opened cassette vertically up to the righthand stop.

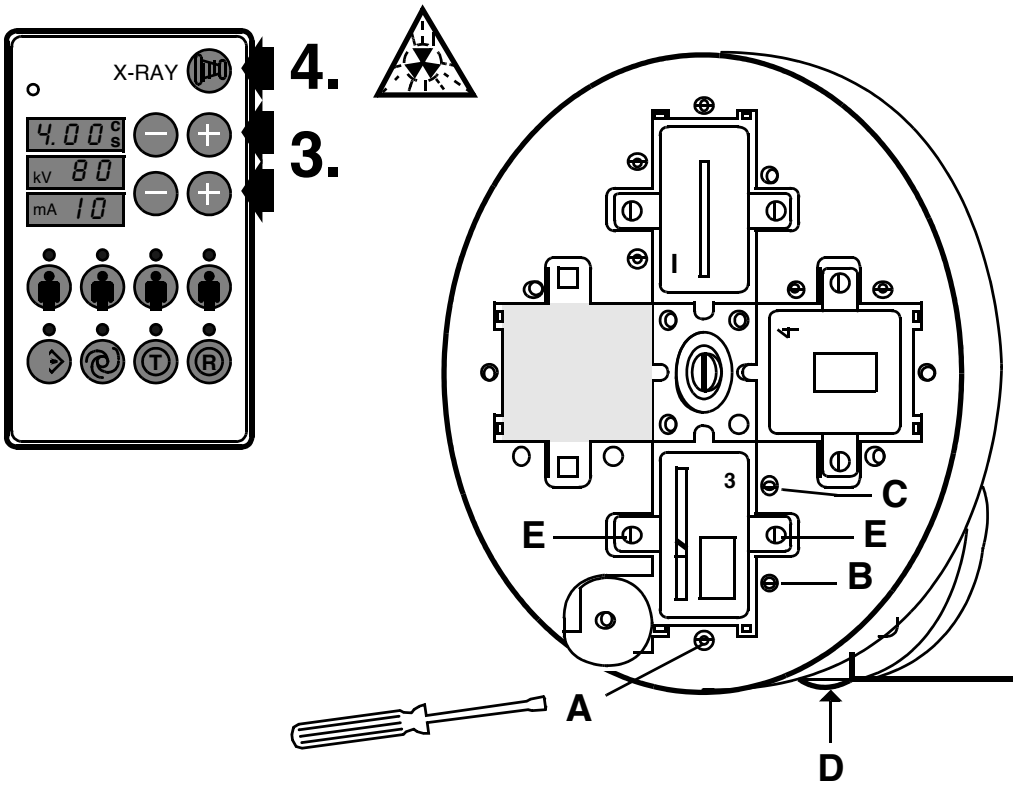
3. **Set maximum kV/mA step** and **radiation time**.
4. Activate **X-RADIATION**.
   Activate X-radiation only for as long as you need to recognize the X-radiation position!
   The luminescent screen must be surrounded on all sides by an even, unexposed margin.

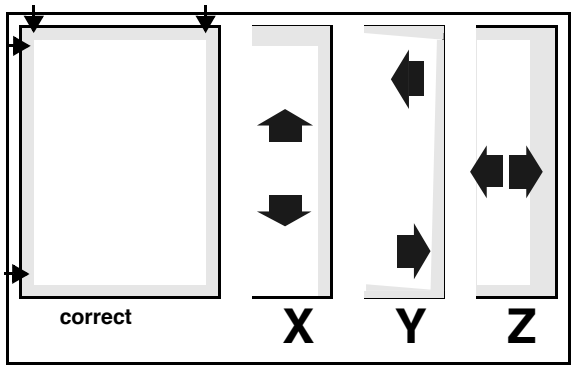
X "High-Low" beam correction:
Loosen two screws **E**. Make the beam correction with screw **A** (eccentric).
retighten screws **E**.

Y "Vertical" beam correction:
Loosen two screws **E**. Make the beam correction with screws **B** and **C** (eccentrics).
Retighten screws **E**.

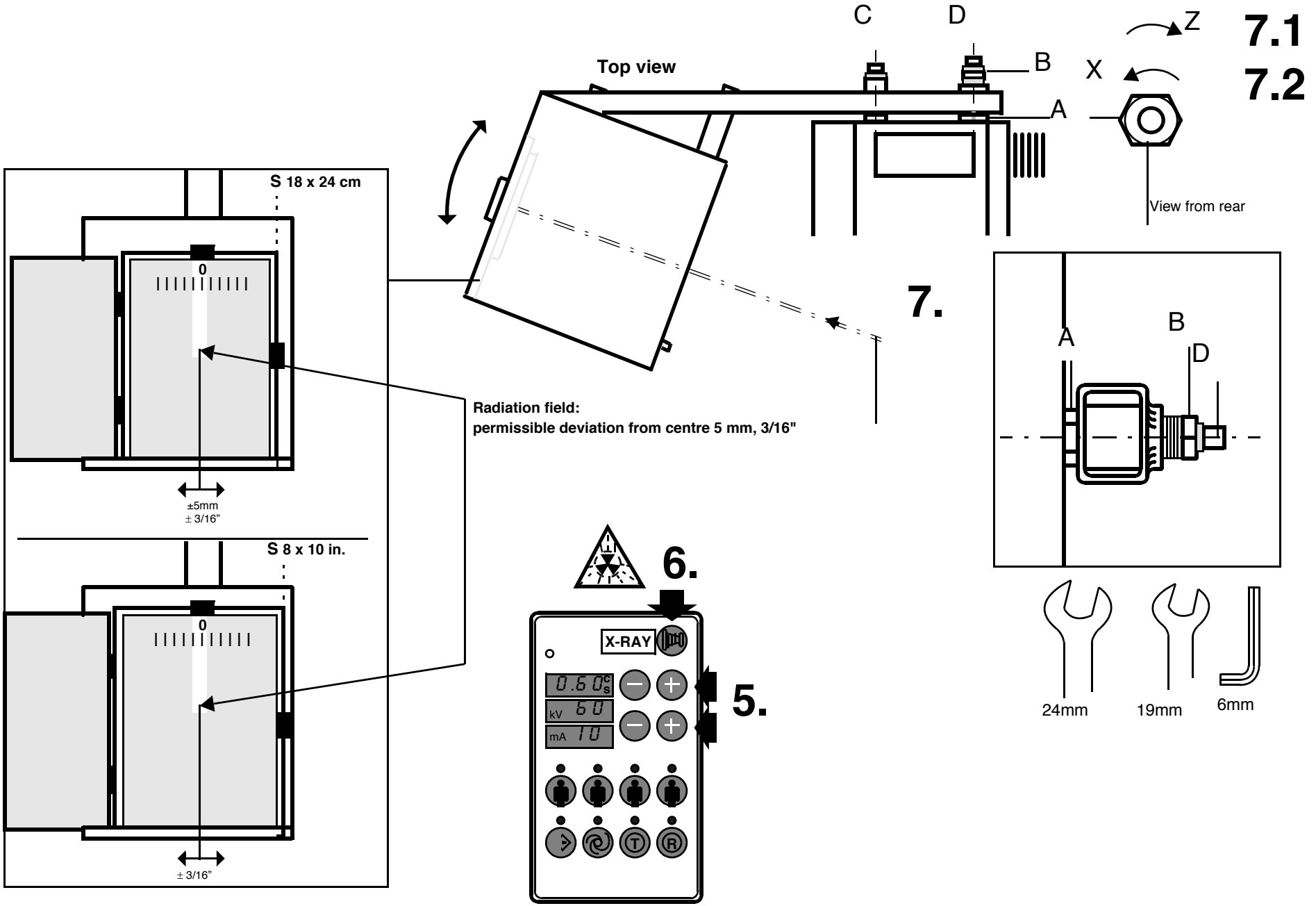
Z "Right-Left" beam correction:
Loosen two screws **E**. Make the beam correction with screws **B** and **C** (eccentrics).
Retighten screws **E**.

NOTE
If the beam correction with the diaphragm adjusting screws is not sufficient, the U section of the cassette holder can be slackened and readjusted.





4.3 Checking and adjusting the X-ray beam for Cephalometry


C
D
Z
7.1
7.2
Top view
B
X
A
View from rear
S 18 x 24 cm
0
±5mm
± 3/16"
7.
Radiation field:
permissible deviation from centre 5 mm, 3/16"
A
B
D
S 8 x 10 in.
0
± 3/16"
6.
X-RAY
0.60
kV 60
mA 10
5.
24mm
19mm
6mm

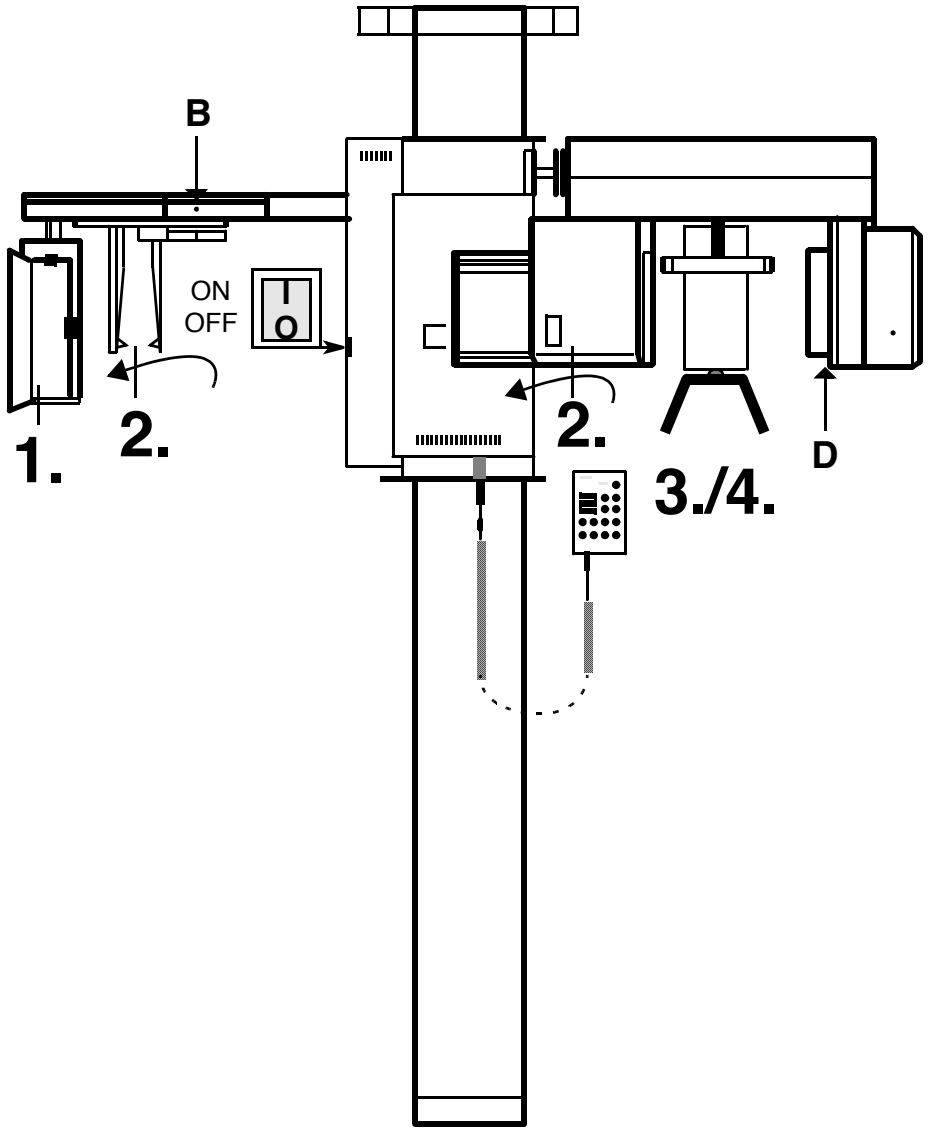
1. Open the film cassette. Place the adjustment screen supplied into the cassette and secure it with adhesive tape. Engage the lateral cassette holder at mark **S 18x24**. Insert the opened cassette all the way to the stop.
2. Swing the nose support out of the beam. Turn the ear olive holder (threaded button **B**) out of the beam direction. Swing the cassette holder for Panorama radiography out of the beam.
3. Select Service program **S.02**, test step **2**.
4. Press the Return key **R**. The X-ray tube assembly travels to the position for Cephalometry. Select primary diaphragm **1** at the diaphragm wheel.
5. Select **80**kV on the Multitimer.
6. Darken the room.
   ATTENTION! RADIATION.
   Release radiation only as long as necessary to recognize the beam position. The radiation field must be **centered** to the **0 mark** on the adjustment screen.
7. **If the radiation field is offset:**
   Loosen screws C and D and make the correction with threaded socket A.
   IMPORTANT: When adjusting the threaded socket A, hold eccentric screw B and do not change its setting.

7.1 **Radiation field is offset to the left:**
Rotate threaded socket **A** in **z** direction.

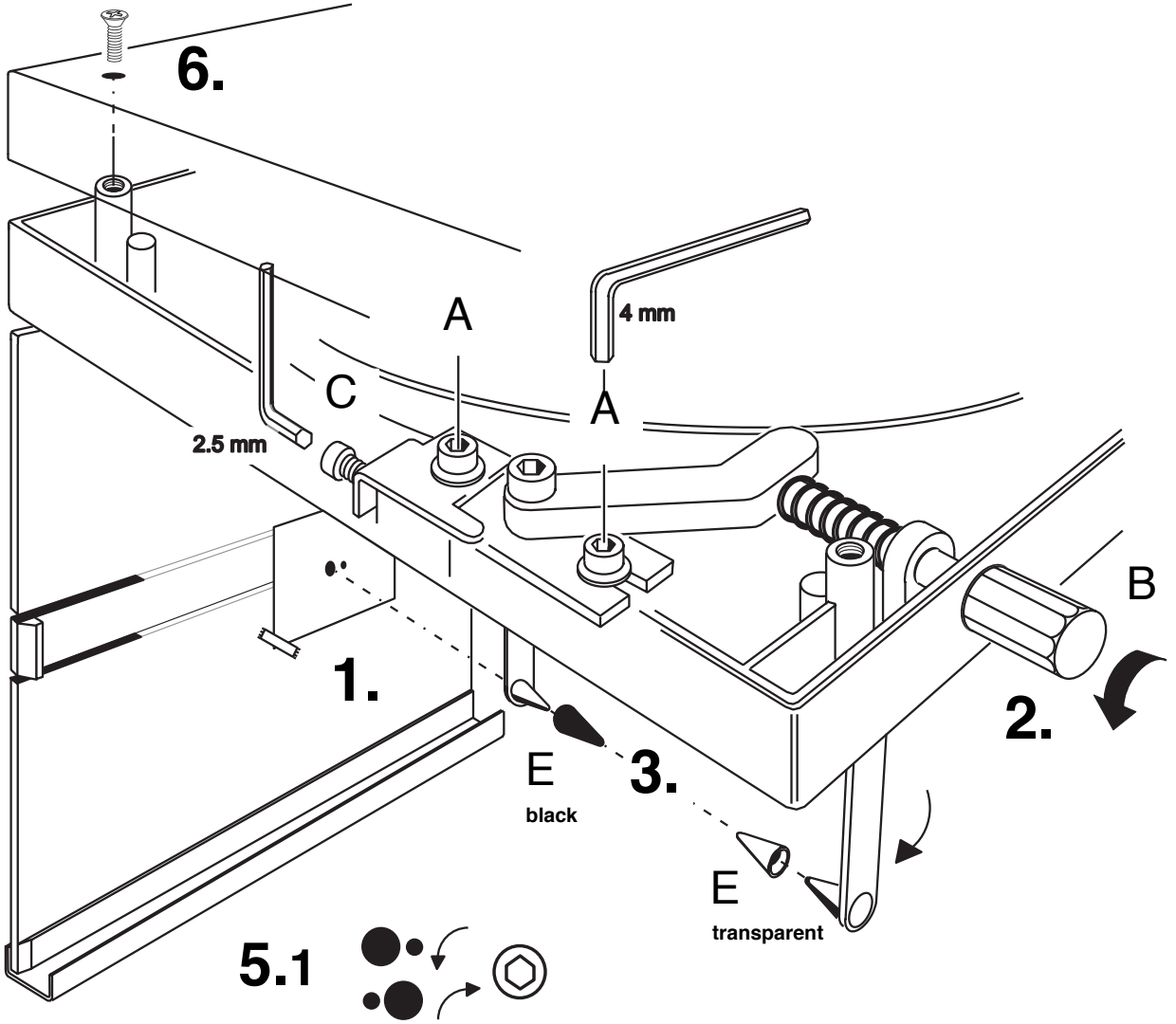
7.2 **Radiation field is offset to the right:**
Rotate threaded socket **A** in **x** direction.

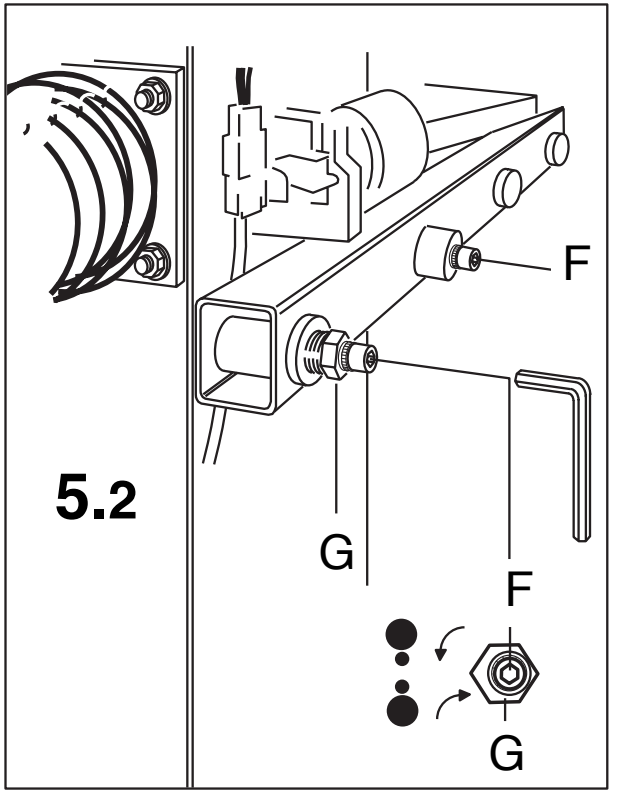
NOTE: One turn of the threaded socket **A** corresponds to a shift of the radiation field in the cassette plane by approximately 15 mm.

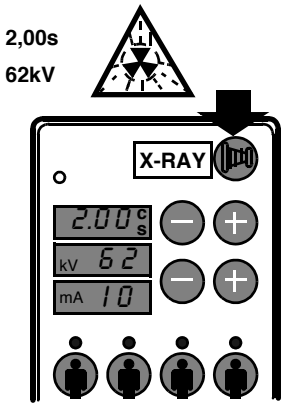
- Retighten screws **C** and **D**.
- Repeat the radiation/correction process until the radiation field is centered to the **0** mark.
- Remove the adjustment screen from the cassette.

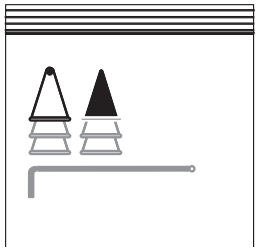


4.4 Checking the symmetry on the Cephalometer


6.
A
4 mm
C
A
2.5 mm
B
1.
2.
E
black
3.
E
transparent
5.1


F
5.2
G
F
G


4.
2,00s
62kV
X-RAY
2.00
kV 62
mA 10



- Metal balls in the adjustment caps are displayed as dots on the screen.
  The two dots must exactly coincide.

1. Pull out the cassette holder all the way and attach an intraoral film with adhesive tape.

2. Loosen knob **B** (rotate ccw) and swivel the ear olives into the beam path.

3. Pull the ear olive holder apart and fit the adjusting caps over the ear olives.

4. Prepare the unit for Cephalometry (see Operating Instructions).
Select 2.00 sec and ≥ 62 kV at the Multitimer.
Release **RADIATION**. Develop and evaluate the film.

5. If the two dots do not exactly coincide, adjust as follows:
Unscrew the upper cover.

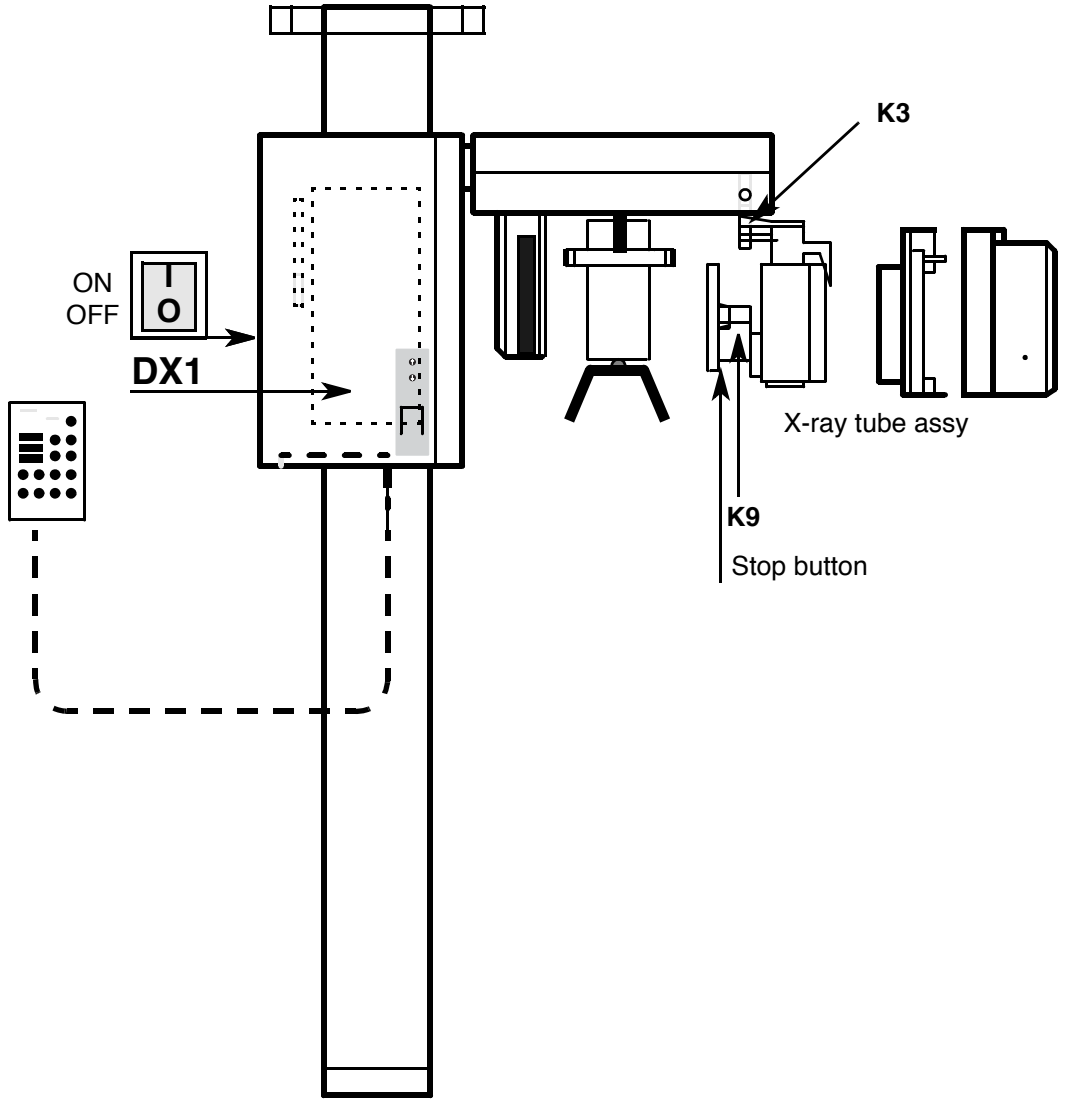
5.1 HORIZONTAL
Loose the two screws **A**.
Turn screw **C** (see above for direction). Retighten screws **A**.

5.2 VERTICAL
Turn screw **F** (see above for direction).

- Repeat the exposure and check the position of the dots again.
- Remove caps **E** and keep them with the unit.

6. Reattach the upper cover.

4.5 Checking and adjusting the ear olives


K3
ON
OFF
I
O
DX1
X-ray tube assy
K9
Stop button

The following steps must be taken:

- Move unit to a convenient position for installing head. Switch unit OFF.
  Remove covers from X-ray head. Remove shielding plate from X-ray head.
  Loosen the clamp which secures the shield.

1. Disconnect plug connection K9 behind diaphragm wheel (only if Ceph unit present).
Cut the cable ties.
ATTENTION: Heavy weight! Unscrew the X-ray tube assembly (four screws) and disconnect K3. Attach the new X-ray tube assembly and connect K3. Tighten the four mounting screws.
Plug in connector K9 and secure the cables with cable ties.

2. Install the diaphragm wheel (diaphragm 1 or 10 downward!) on the new X-ray tube assembly (one screw in the center, on Panorama unit ons screw to secure against rotation).
Ensure that the locking button (if present) functions properly!

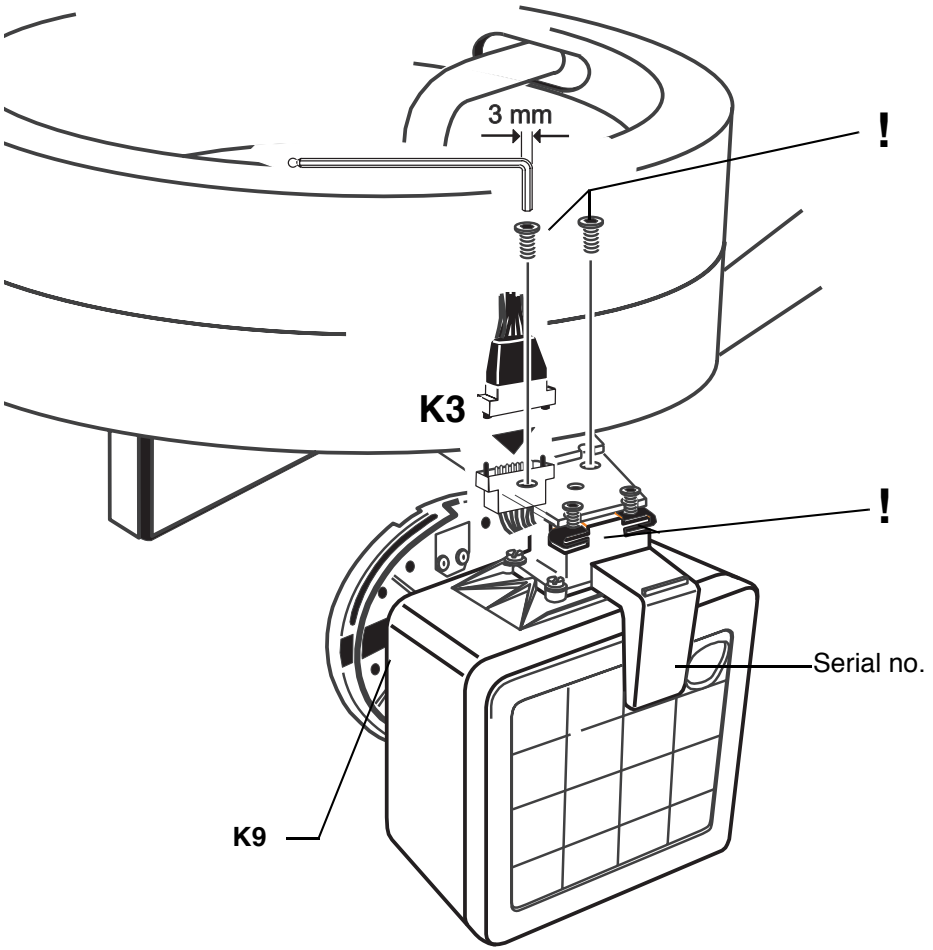
3. Adjust board DX1 to the new X-ray tube assembly.
Proceed according to section **'Adjusting board DX1',** see page 4 - 31.

4. ORTHOPHOS 3 DS: Readjust diaphragm 10 for Panorama radiography.
ORTHOPHOS 3: Readjust diaphragm 1 for Panorama radiography.
Proceed according to section **'Checking and adjusting the X-ray beam for Panorama radiography',** see page 4 - 13.

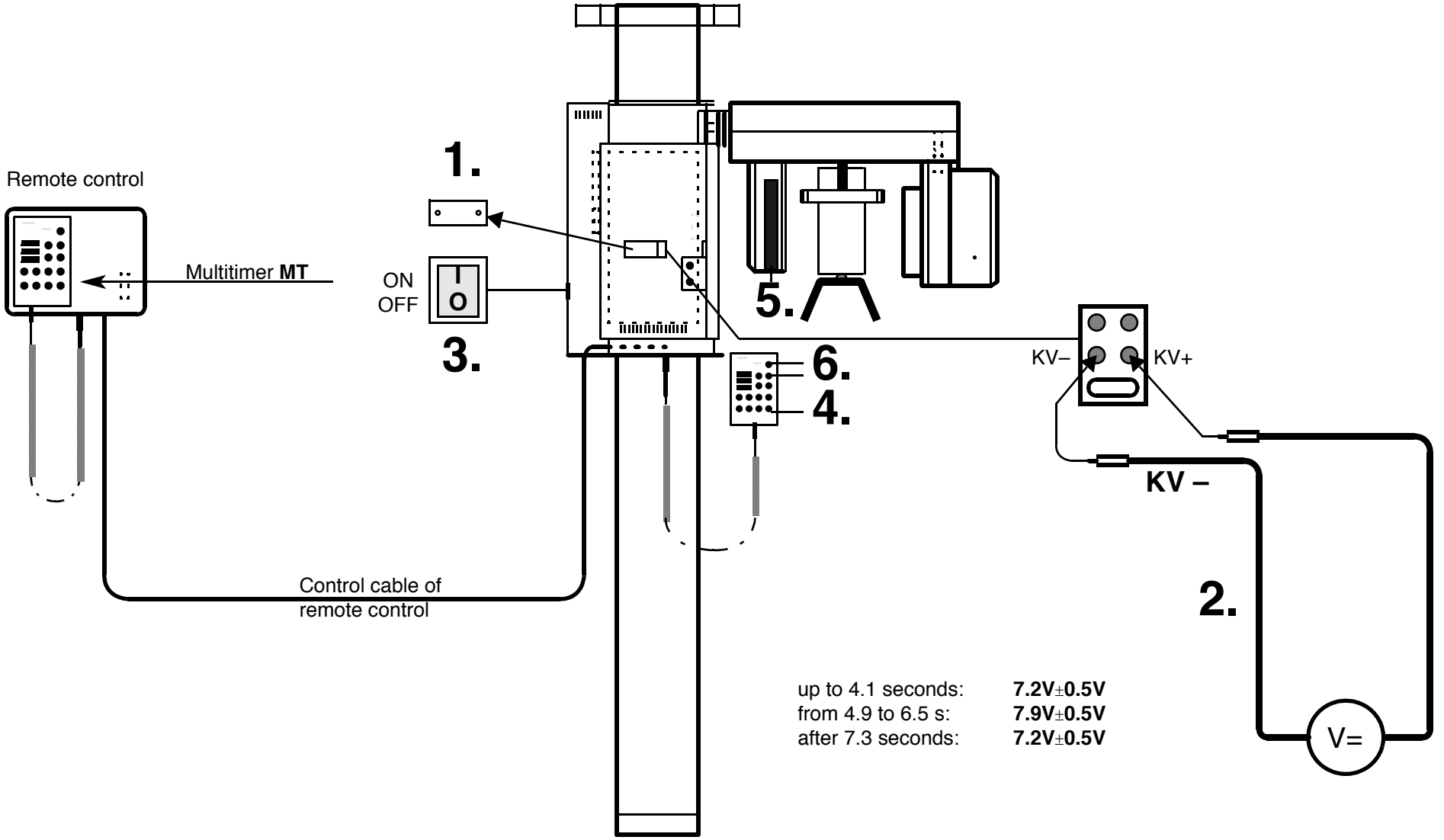
5. Orthophos 3 Ceph: Readjust diaphragms 3 and 4 for Cephalometry.
Proceed according to section **'Checking and readjusting the X-ray beam for Cephalometry',** see page 4 - 17.

- The X-ray tube assembly is now matched to the other unit components.
  Enter the new serial number in the warranty passport.

  In Germany:
  Perform an Acceptance test according to the "Röntgenverordnung" (X-ray ordinance).



4.6 X-ray tube assembly: action to be taken during/after replacement?



up to 4.1 seconds: **7.2V±0.5V**
from 4.9 to 6.5 s: **7.9V±0.5V**
after 7.3 seconds: **7.2V±0.5V**

- During a Panorama radiograph of the spinal column region the kV value is automatically increased by up to 12% according to the kV/mA setting.
  This kV increase can be measured as follows:
- Set user offset to 0 using Service routine S.11.

1. Remove the small metal cover.

2. Connect a voltmeter to **KV+** and **KV-** and select measuring range **20 V**.

3. Turn the unit ON and wait for the self-adjustment to execute.

4. Press the **R** key. The X-ray tube assembly travels to the start position.

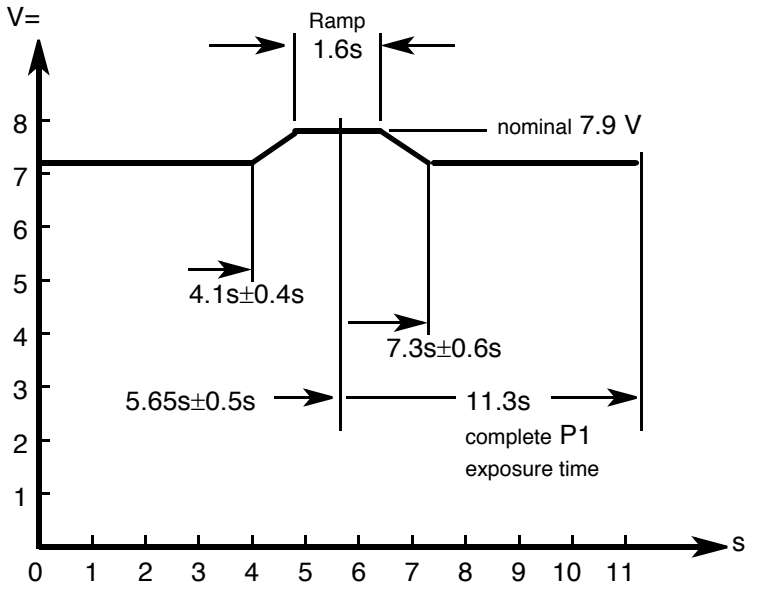
5. Example for an exposure: Select program **P1** and **72kV10mA** on the Multitimer.
The ready LED must be off.

6. **ATTENTION: RADIATION**! Press the release button and wait for a complete rotation.

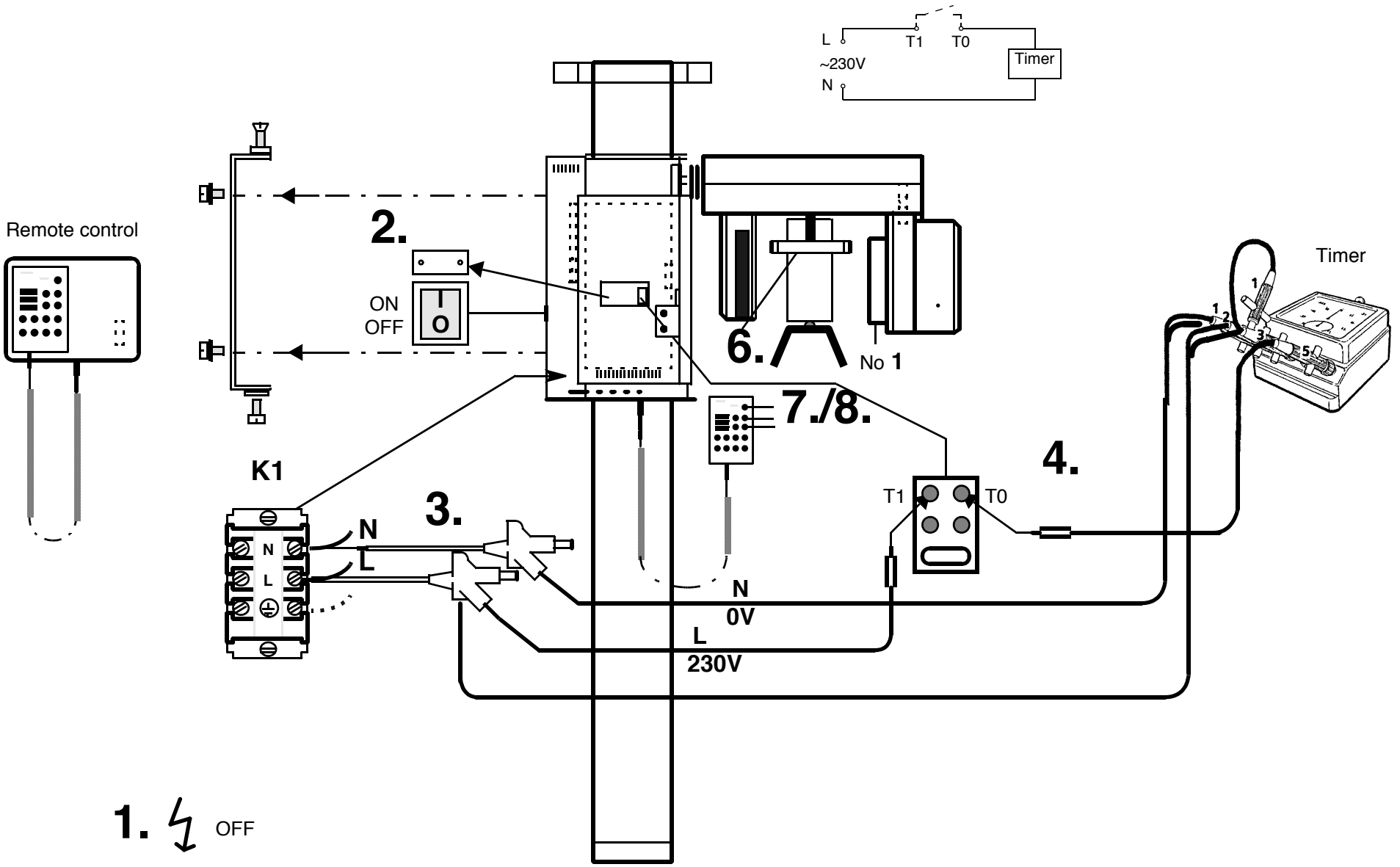
The following values must be reached:

up to 4.1 seconds: 7.2 V ± 0.5 V
from 4.9 to 6.5 sec: 7.9 V ± 0.5 V
after 7.3 seconds: 7.2 V ± 0.5 V

If the value 7.5 V ± 0.5 V is not reached, board DX1 is defective.
Replace board DX1 and perform "Adjusting board DX1", ☝ see page 4 - 31.



4.7 Radiographic density of spinal column not correct


L
T1
T0
~230V
N
Timer
Remote control
2.
ON
OFF
6.
No 1
7./8.
Timer
K1
3.
4.
T1
T0
N
L
N
0V
L
230V
1. OFF
5. ON

- **Panorama radiography**

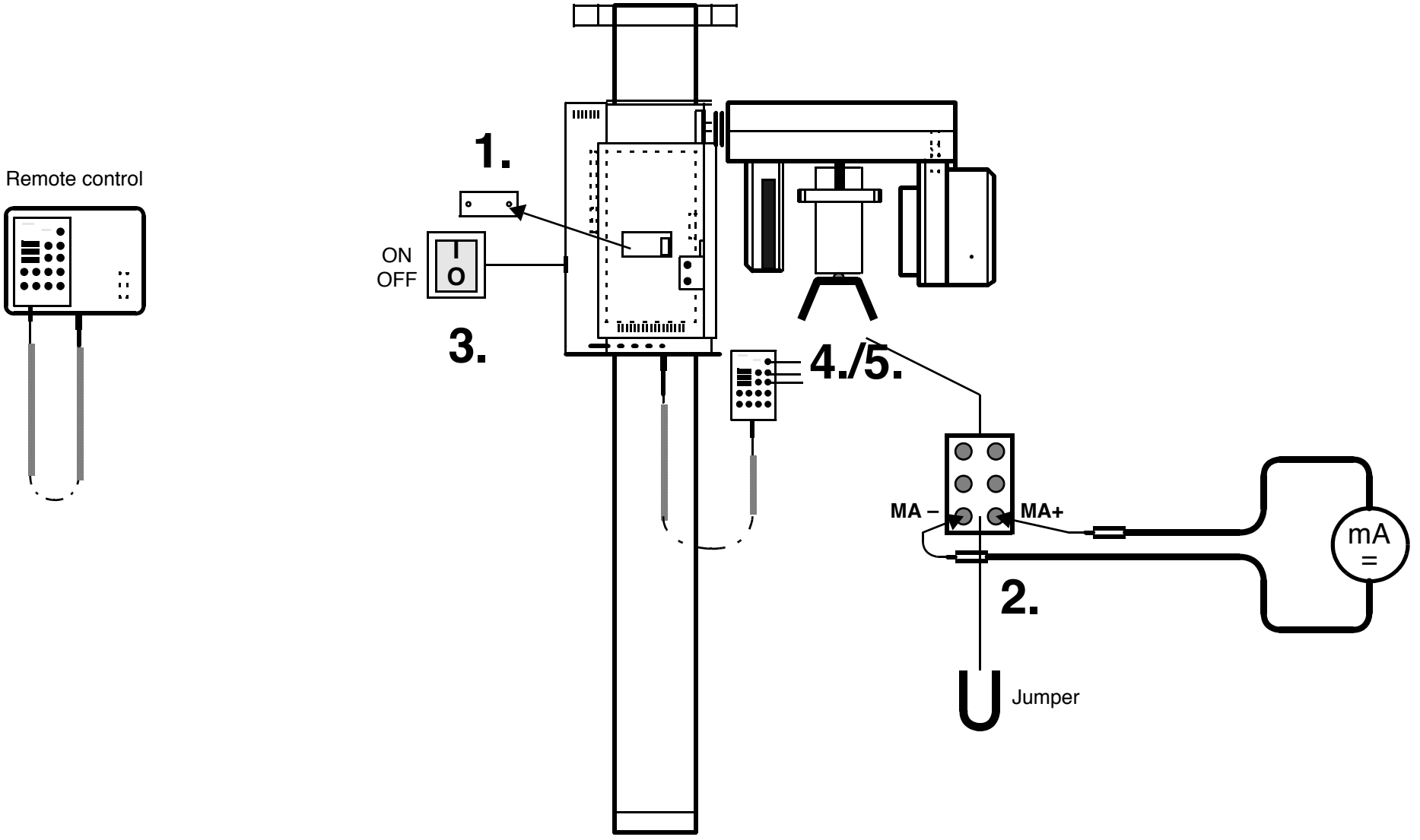
1. Turn the unit OFF. Switch off the power supply line for the building.
2. Take off the side cover and the front cover.
3. Connect the timer to K1.N (0 V) and K1.L (230 V) (line voltage).
4. Connect the leads to test jacks T0 and T1.
5. Switch the power line and then the unit ON. Wait for the self-adjustment to execute.
   Move the X-ray tube assembly to the start position (by pressing the R key).
   ORTHOPHOS 3 DS: select diaphragm 10.
   ORTHOPHOS 3: select diaphragm 1.
6. Fully open the temple support!
7. Select program **P1** and **72kV10mA** on the multimeter.
8. **ATTENTION: RADIATION!** Press the release button until the X-ray display switches off automatically (complete rotation).

- The timer must indicate an exposure time of **11.3 s** ± 0.7 s.
- If the specified exposure time is not reached:
  Replace board DX 1 and perform '**Adjusting board DX1',** see page 4 - 31.

- **Cephalometry**

- Leave the timer connections unchanged.
- ORTHOPHOS 3 Ceph: Set the Ceph function by selecting diaphragm 3 or 4 and select 1s radiation time.
- Select **72kV/10mA** on the Multitimer.
- ATTENTION: **RADIATION**! Press the release button until the X-ray display switches off automatically.
- The timer must indicate an exposure time of **1 s** ± 0.05 s for ORTHOPHOS 3 Ceph.
- If the specified exposure time is not reached:
  Replace board DX 1 and perform '**Adjusting board DX1',** see page 4 - 31.

4.8 Checking exposure times


Remote control
1.
ON
OFF
3.
4./5.
MA –
MA+
mA
=
2.
Jumper

1. Unscrew the cover.
2. Remove the MA+/MA jumper and connect the ammeter instead. Select the 20 mA measuring range.
3. Turn the unit ON. Wait for the self-adjustment to execute.
4. Select Service routine **S.01**.

Additionally with ORTHOPHOS 3 DS:

Establish SIDEXIS exposure readiness by selecting **Constancy check** in the service menu
Service exposure
Factory service (2)
or set the Active signal internally with Service Routine S.35, test step 02, see page 5 - 59

5. **Measurement**

- Select the following step on the Multitimer: 72kV/10mA.

  ATTENTION: RADIATION! Press the release button, hold it pressed and take the measurement.
  The ammeter must read **10 mA ± 0.5 mA**.

- If the measured value is OK, pull off the wires and insert the jumper again.
  Attach the covers.

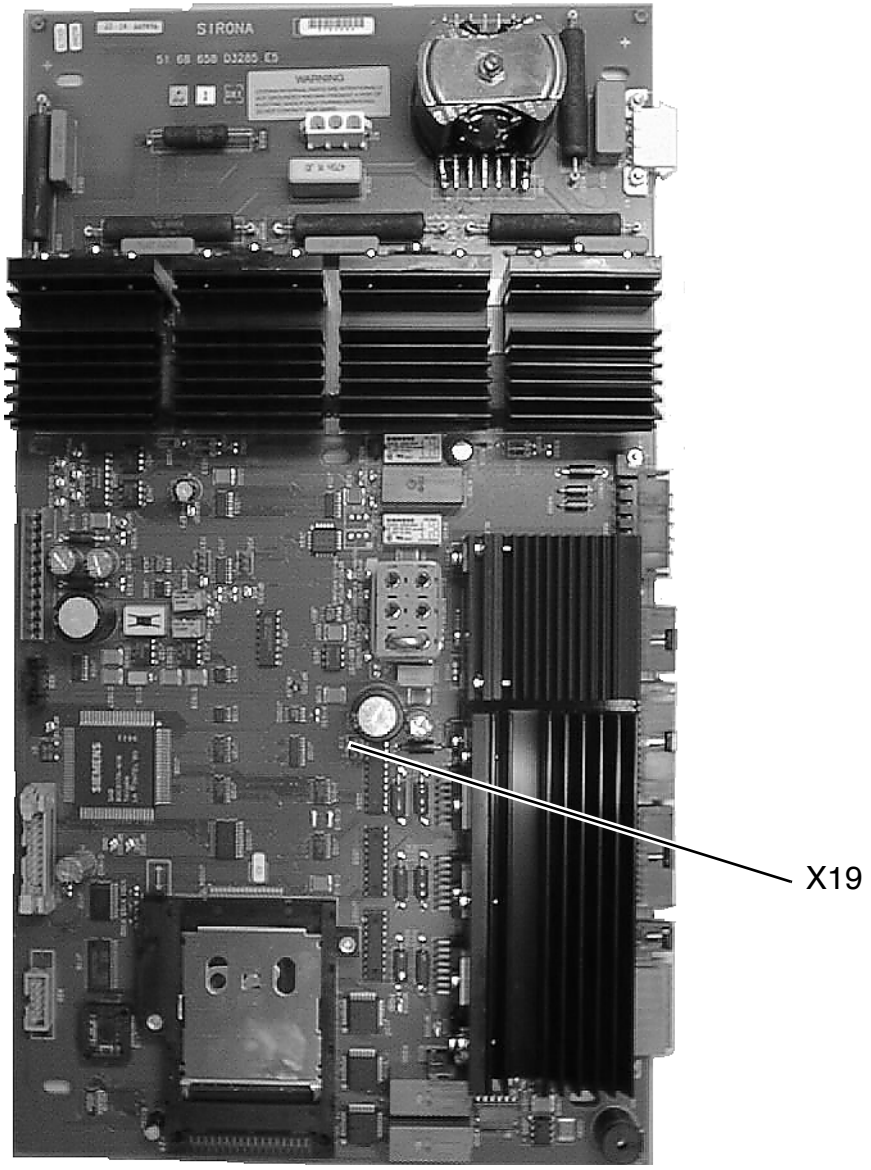
- If the specified mA values are not reached, the mA setpoint must be checked:
- Select Service routine **S.03**, test step 02 or 04, and set the mA setpoint (see section "Service routines").

- Then perform Service Routine S.05, test step 02.

- If the specified values are now reached check the tube current again as described above.
- If the specified values are still not reached, adjust board DX1.
  If this is not possible, replace board DX1 and perform **'Adjusting board DX1',** see page 4 - 31.
  If the values are still not reached, replace the X-ray tube assembly.

4.9 Checking the tube current

51 68 658



- After replacing the board plug in all connectors so that they are properly engaged.
- Plug memory card from old board DX1 onto new board.
- Check plug X19:
  On **ORTHOPHOS 3** / **3 Ceph** the **jumper** must be plugged to pins **X19.2** and **X19.3**.
  On **ORTHOPHOS 3 DS** the **jumper** must be plugged to pins **X19.1** and **X19.2**.
  (Connector X19 "configures the address line" and is important for enabling the storage of system data and settings.)

- After turning the unit ON it executes the self-adjustment. Wait until the usual displays of program/exposure time, kV and mA light up on the Multitimer.
- Perform all checks and adjustments according to section **Service routines**.

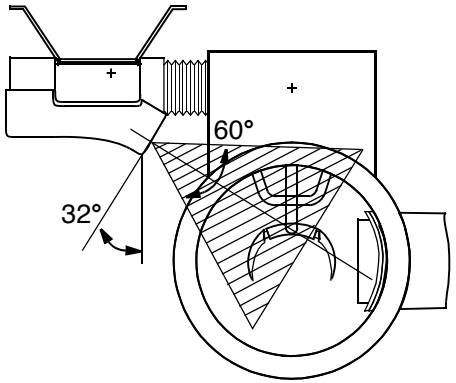
- Select Service routine **S.03**
  test step **04** (automatic system) for DX1 51 68 658.
  Adjust **setpoint values** for kV, mA and preheating.
- Select Service routine **S.05**, test step **02** (automatic system)
  Perform the **Heating adjustment**.
- Select Service routine **S.04**, test step **03**
  Check the **actual values** of kV, mA and preheating.

- Check the Unit identification with Service routine S.17.

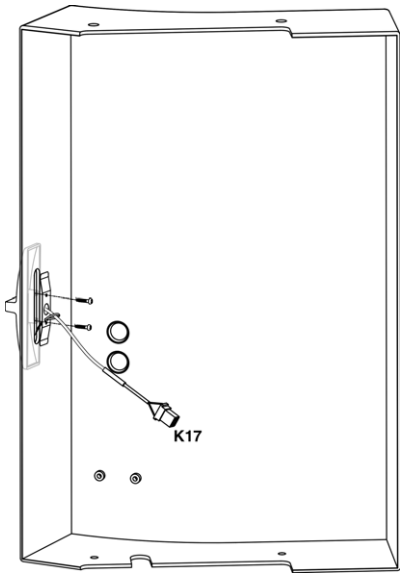
- **Country-specific Adjustments**:
  – With Service routine S.25 Adjusting the film/screen combination or the kVmA step series.
  – With Service routine S.27 Setting country code.

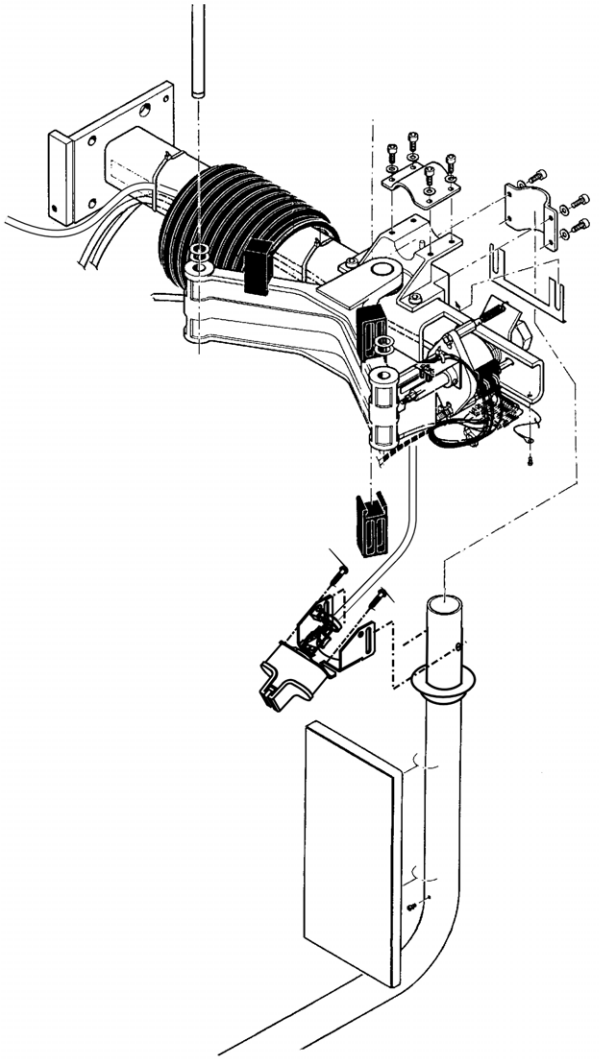
- Turn the unit OFF and ON again to exit the service routines.
- Board DX1 is now correctly matched to the X-ray tube assembly.
- Reattach all shielding covers!
  Screw the small metal cover on again.

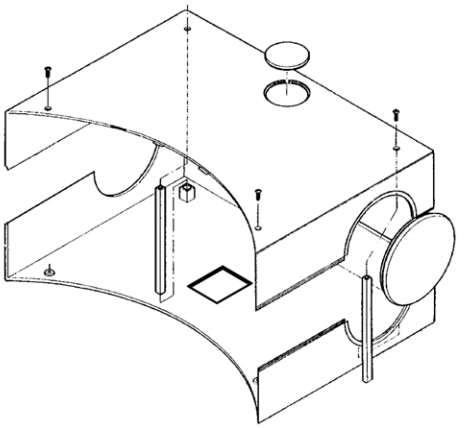
4.10 Adjusting board DX1

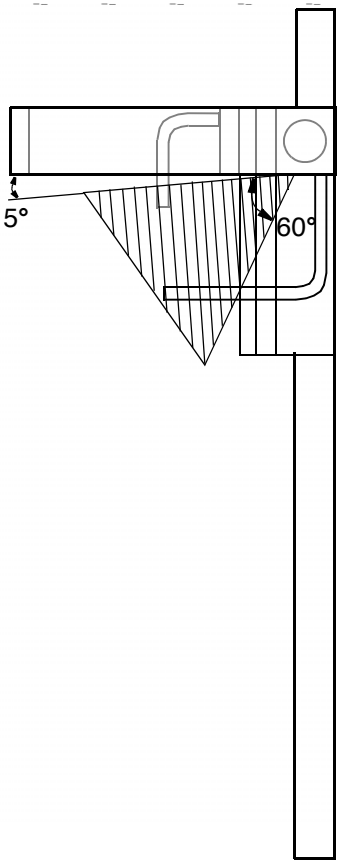


1.



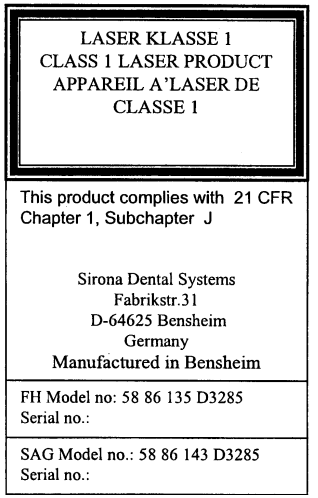






2.

- The device contains a class 1 laser product.
- The light localizers are used for correct adjustment of the patient position.
  They must not be used for any other purposes.
  A distance of at least 100 mm must always be maintained between the viewer's eyes and the laser. Do not gaze into the beam.
- When the height adjustment key ↑ is pressed, the laser light localizers are always automatically switched on for 1min.
- To check the light localizers, fasten a piece of paper in the head support and mount the subnasal contact segment. The laser beam will then be displayed as a red line.
- The horizontal light beam must impinge (strike) the paper horizontally.
- The central light beam must impinge the median line of the contact segment vertically.



1. Correcting the horizontal light beam.
If the light beam is not horizontal:
Check to make sure that the front cover is properly attached and the column is at a right angle to the rotary ring. If these trouble sources can be excluded, the complete laser module must be replaced. To do this, first unscrew the cover. Then unplug connector K17 and loosen the screws. Finally, fasten a new laser module with the screws.

2. Correcting the central light beam.

2.1 If the light beam does not impinge on the median line of the contact segment:
Loosen the screw fastening the laser module to the support tube and align the light beam to the median line of the contact segment by rotating the module. Then retighten the screw.

2.2 If the light beam is not vertical:
Align the light beam by turning the metal angle plate slightly.

4.11 Checking and adjusting the light localizers

sirona
The Dental Company

5 Service Routines

Service Routines

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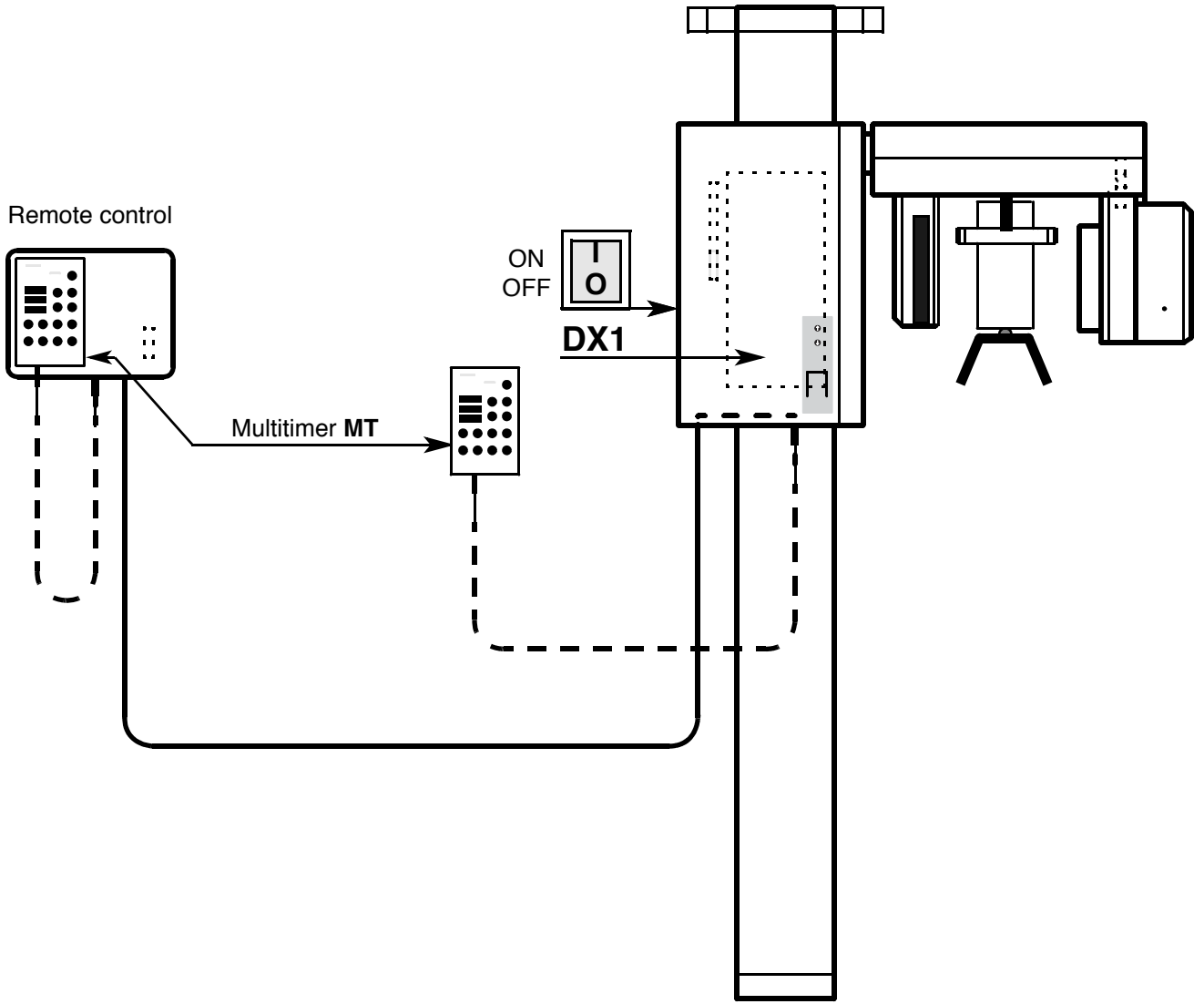

Remote control
ON
OFF
I
O
DX1
Multitimer **MT**

- **The Service routines are used to check the functionality of certain unit components and assemblies.**

Selecting a Service routine

1. Press the **Memory** key.
2. Then press the service key for about 4 sec until the digital displays disappear.

Within 3 seconds:

3. Press the **Patient symbol** keys in the sequence **A – B – C** within 3 seconds.
   You have then entered the service mode.

   If during the selection of the Service routine this sequence is not followed, a wrong key is pressed or the time is exceeded, the unit switches automatically back to the normal mode.

   **** A maximum of 99 error messages can be stored.***
   0E means that at this point the unit was turned OFF and ON again.
4. Press the service key.
   The digital display indicates Service routine **S.01**
5. Select the desired Service routine with the **+** or **–** keys (for example S.04).

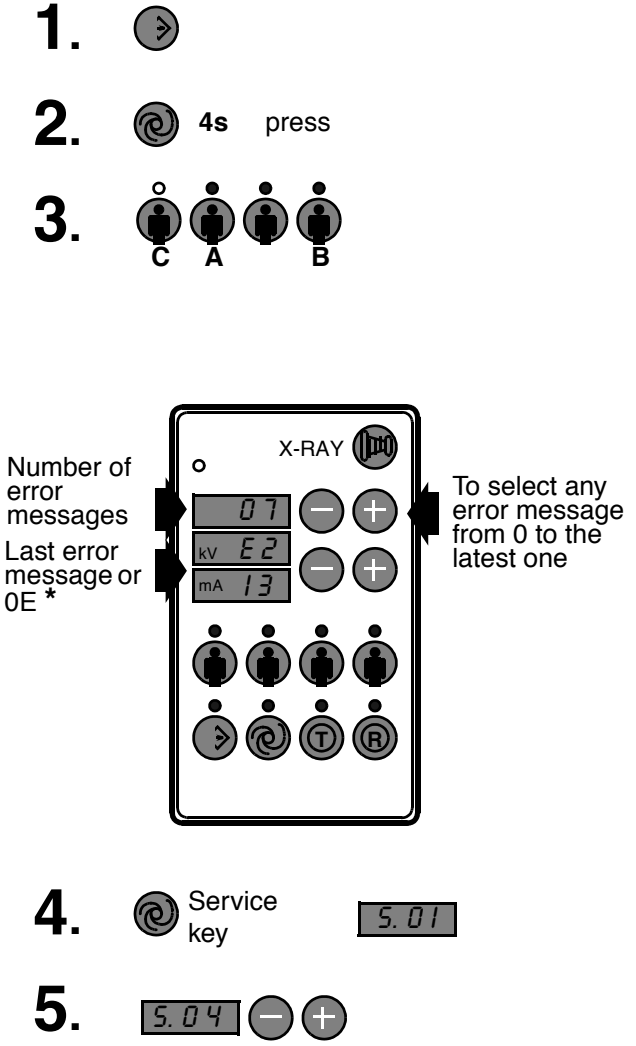
   The selection of Service codes and test steps is described for the individual service routines on the following pages.

Deselecting a Service routine

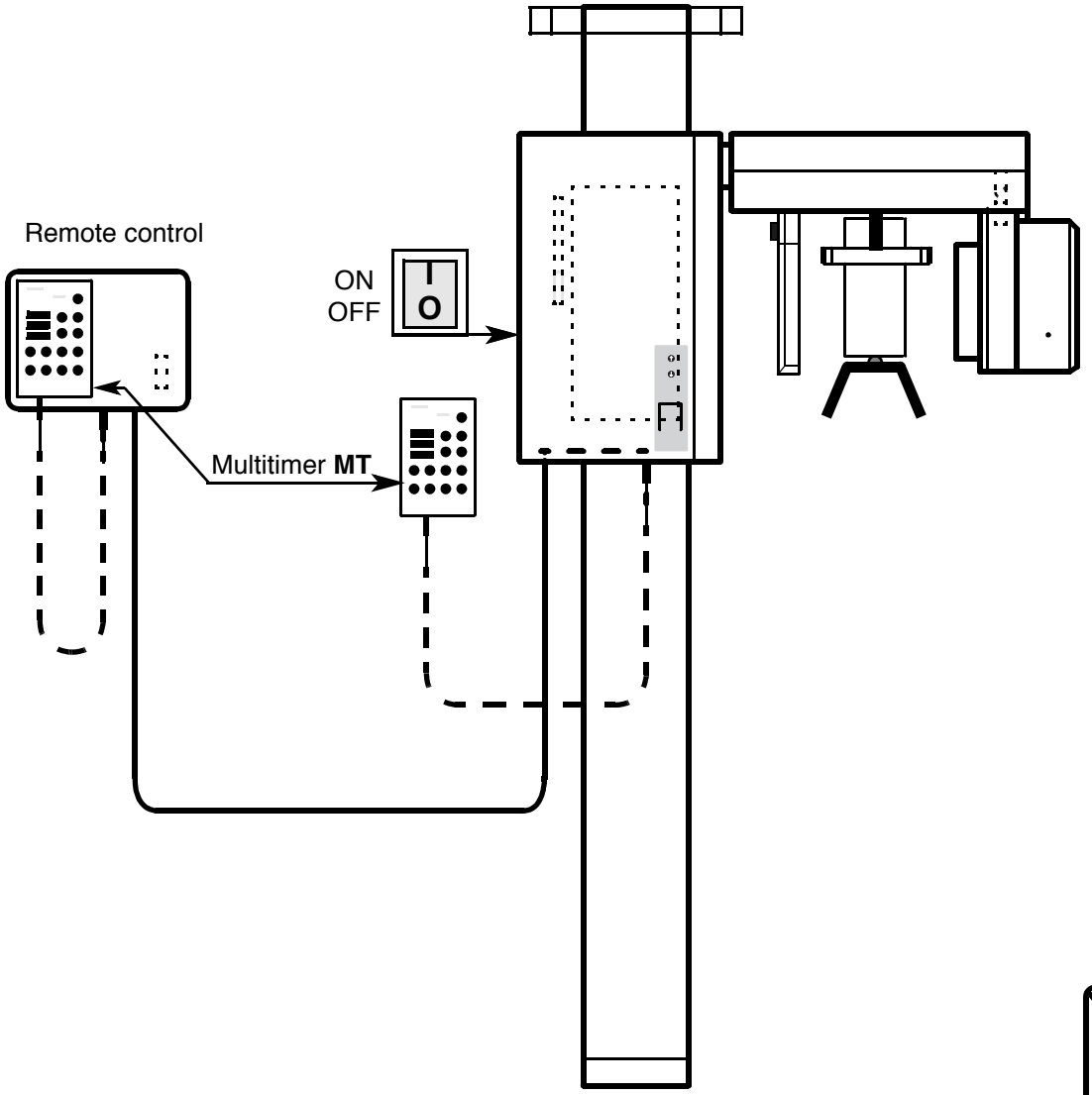
Switch the unit OFF and ON again.

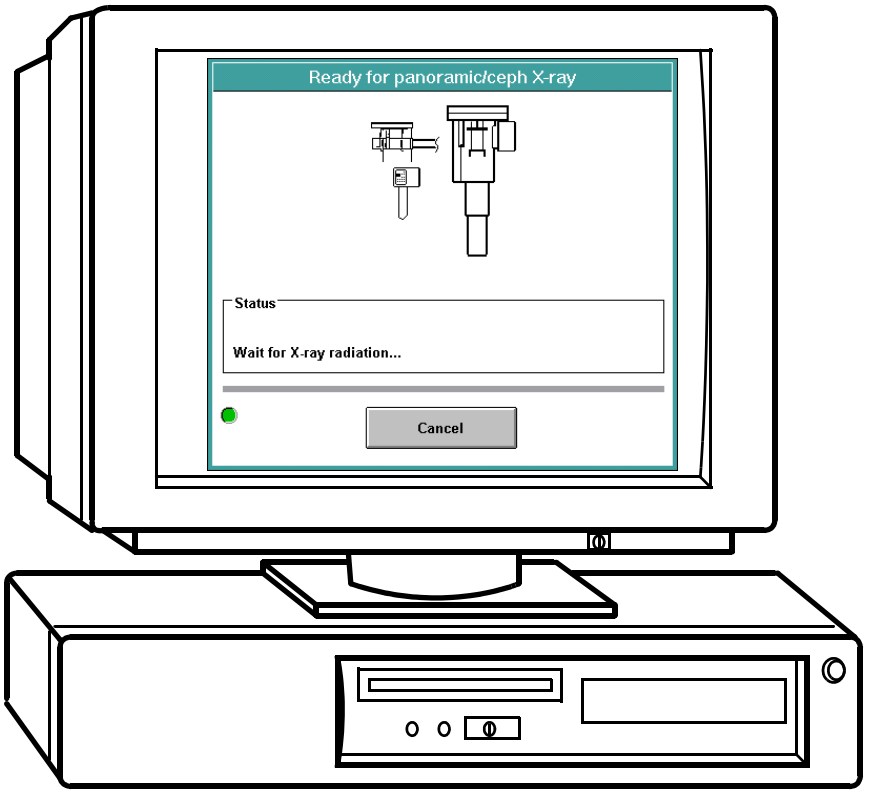
.

ORTHOPHOS 3 DS: for all service routines with radiation, set exposure readiness via SIDEXIS. See next page **or**
set the Active signal internally with Service Routine S.35, test step 02.
☝ see page 5 - 59.



5.1 Selecting Service routines


Remote control
ON
OFF
I
O
Multitimer **MT**


Ready for panoramic/ceph X-ray
Status
Wait for X-ray radiation...
Cancel

Additionally for ORTHOPHOS 3 DS:

For all Service routines with radiation, set exposure readiness via SIDEXIS.
NOTE: It is also possible withService Routine S.35, test step 02, to set a radiation release internally ☝ see page 5 - 59.

Switch on the PC and the monitor.

Activate the **Services** menu.
Activate the **Constancy check** menu item.
In the **X-ray apparatus** menu activate the **Select** menu window.
Activate the **XC XP** tool.
The selection dialog **Select type of check** appears:

Service radiograph
Approval test
Constancy check
Terminate

If another dialog appears, select

Terminate

and activate **XC XP**.
In the dialog **Select type of check**

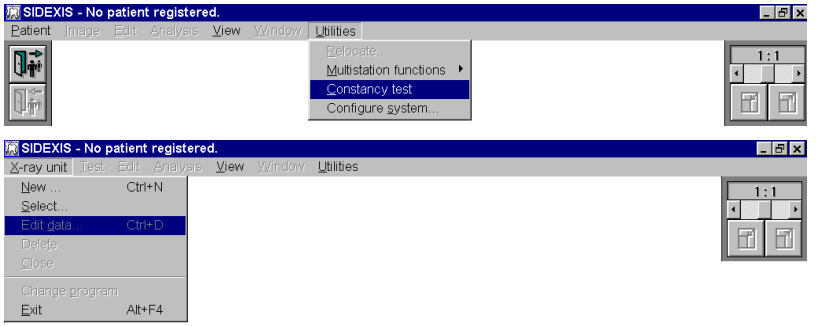
activate Service radiograph.

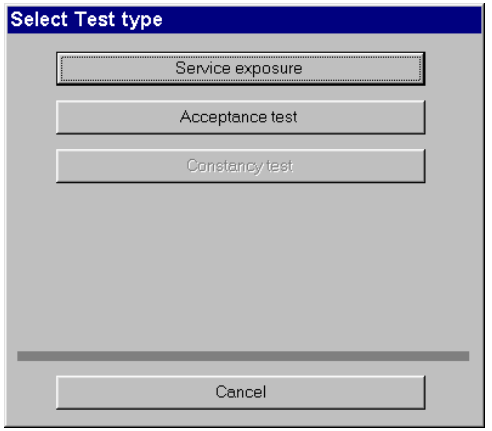
The selection dialog **Select Service exposure** appears.

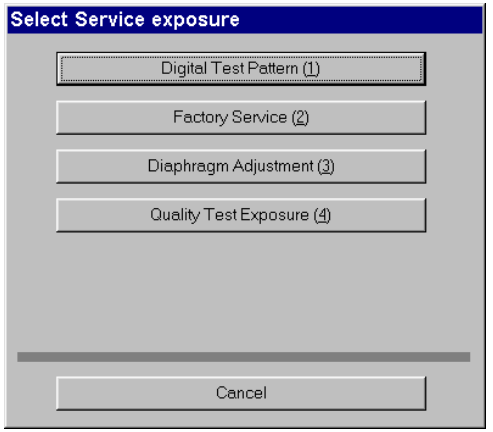
Digital test display (1) (checks the transmission path ORTHOPHOS - PC)
Factory service (2) (sets the locking signal for service program, if not E4 08)
Diaphragm adjustment (3) (diaphragm adjustment, radiation field image)
Quality test exposure (4) (test exposure not stored in PDATA)

Terminate

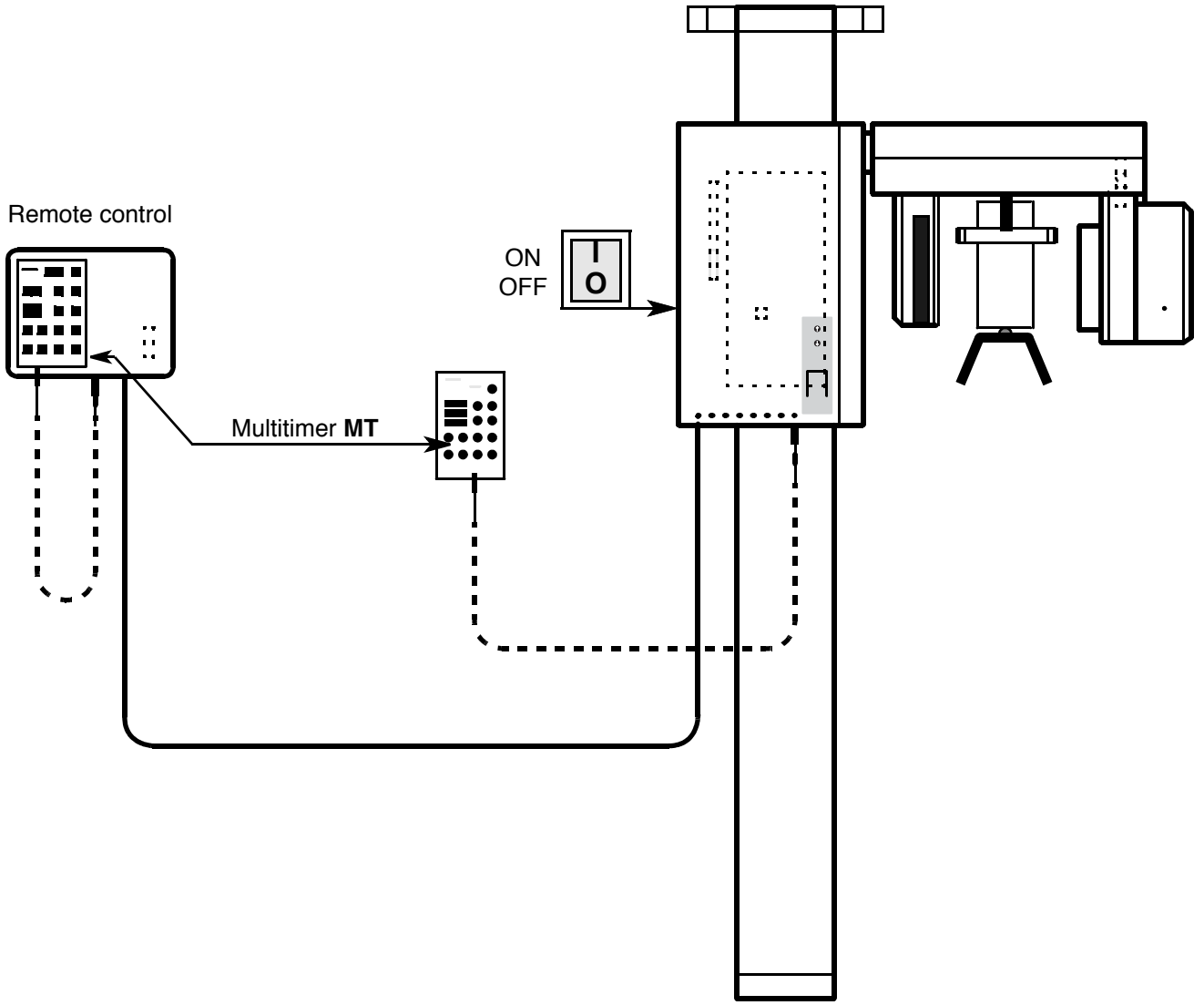
If the service password is requested the current system date (the first four digits) must be entered in reverse order (see SIDEXIS Service Manual).
E.g. May 24, 1995 (24.05 1995) becomes 5042.







5.2 Setting exposure readiness on the PC


Remote control
ON
OFF
I
O
Multitimer **MT**

- **Radiation without rotation can be released with Service routine S.01.**

  Additionally with ORTHOPHOS DS: set readiness for exposure as described in section '**Setting exposure readiness on the PC'**. Select **Factory service (2)**.
  or **set the Active signal internally with Service Routine S.35, test step 02.**
  ☝ see page 5 - 59.

1. Select Service routine **S.01** as described in section '**Selecting service routines'**.

2. Then briefly press the service key.
The kV display indicates **00**.

3. Enter service code **01** with the + key.

4. Then briefly press the service key.
The values on the kV/mA display flash. The kV values can now be altered.
The LEDs above the patient symbol keys light up.

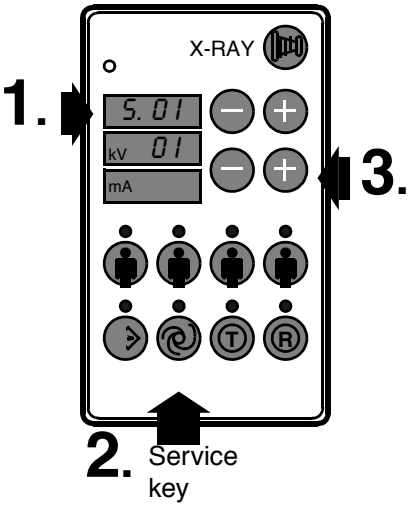
5. **RADIATION** can now be generated.
The actual radiation time is displayed after releasing the exposure button.

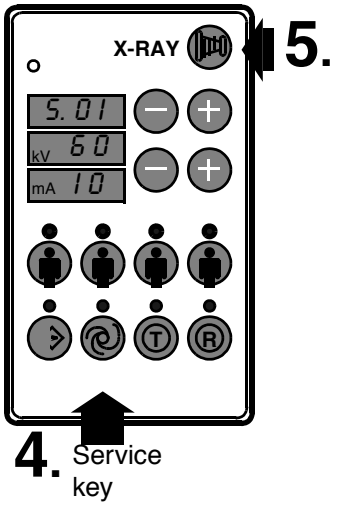
NOTE: If error message **E4 08** is displayed SIDEXIS is not ready to release an exposure or an internal active signal is missing.

The radiation time is limited to a maximum of 14 seconds.
The maximum radiation time of 14 seconds lights up. Press the R key.

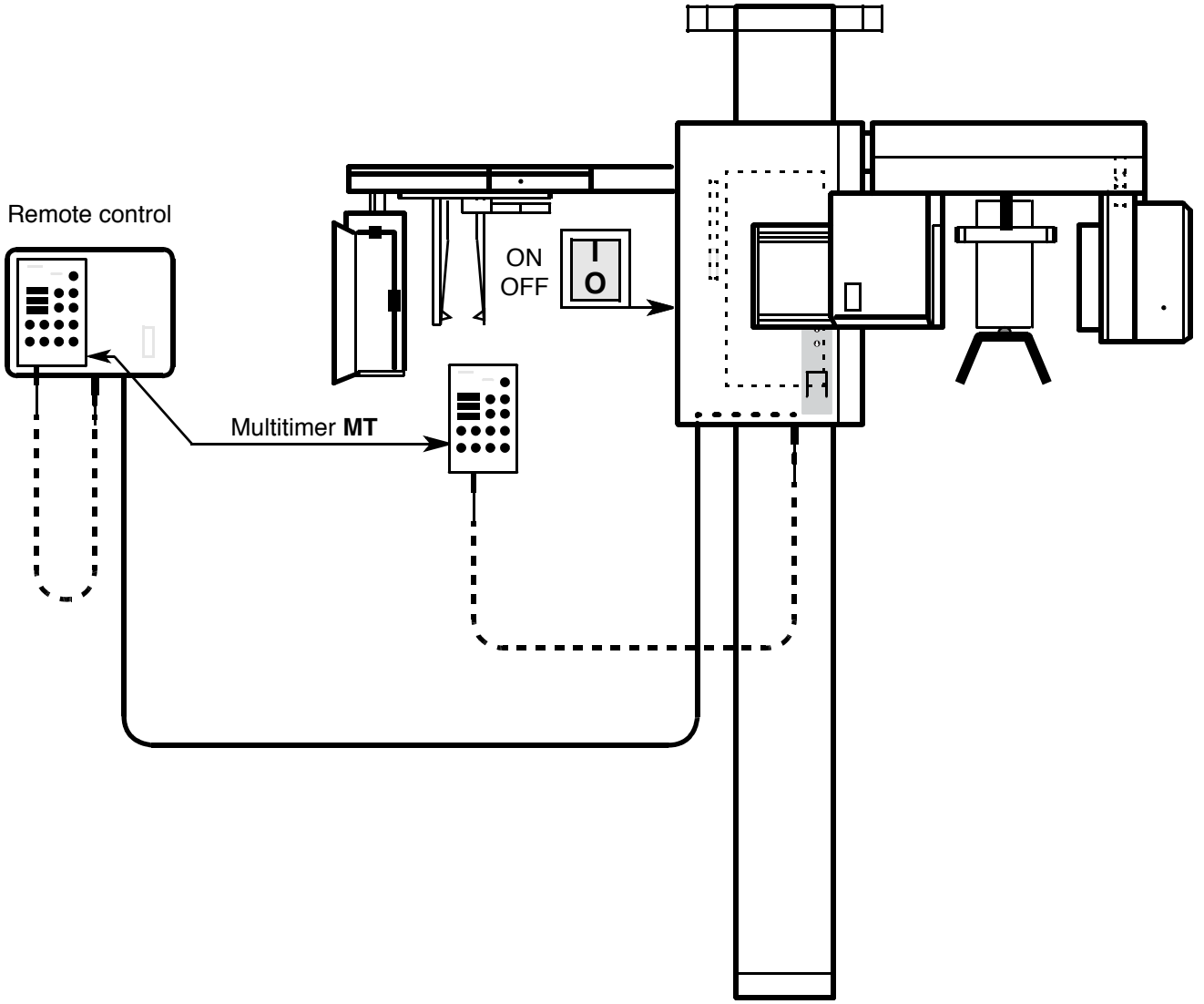
If an exposure is released during the cool-down period, the elapsed cool-down time is displayed (automatic exposure blockage). During this time the LED above the R key flashes.

Briefly press the service key. The Service routine S.01 is terminated.





5.3 Service routine S.01 Radiation without rotation


Remote control
ON
OFF
I
O
Multitimer **MT**

- **Radiation without rotation and with exposure times for cephalometry can be released with Service routine S.02.**

  Additionally with ORTHOPHOS DS: set readiness for exposure as described in section '**Setting exposure readiness on the PC'**. Select **Factory service (2)**.
  or **set the Active signal internally with Service Routine S.35, test step 02.**
  ☝ see page 5 - 59.

1. Select Service routine **S.02** as described in section "Selecting service routines".

2. Briefly press the service key .
The kV display indicates **00**.

3. Enter service code **02** with the + key.

4. Briefly press the service key .
Test step **01** appears on the mA display.

ORTHOPHOS 3/3 Ceph: select Pan or Ceph diaphragm.

NOTE:
In **test step 01**: Radiation can be released in any position of the X-ray tube assembly.
In **test step 02**: Radiation can be released in the Cephalometry position of the X-ray tube assembly.

Test step 02 can be selected with the + key for kV adjustment.
To exit a test step briefly press the service key .

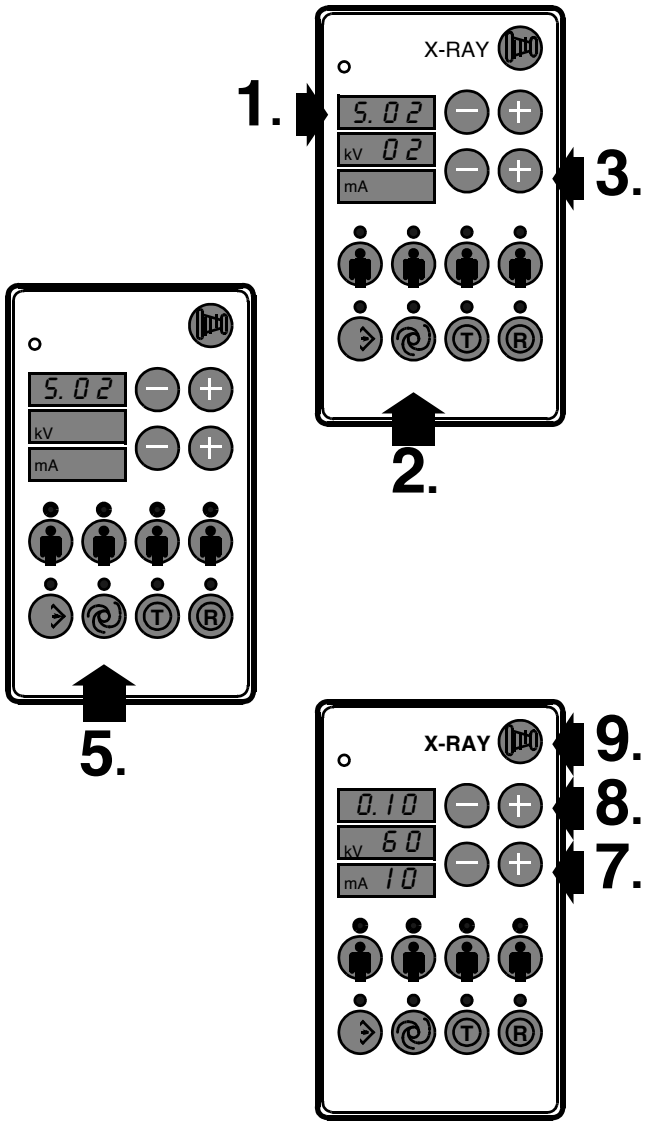
5. Briefly press the service key .
The values on the kV/mA display flash.
The LEDs above the patient symbol keys light up.

6. Essential for test step 02: move the cassette holder to the Cephalometry position and then press the Return key R. The X-ray tube assembly then travels to the Cephalometry position.

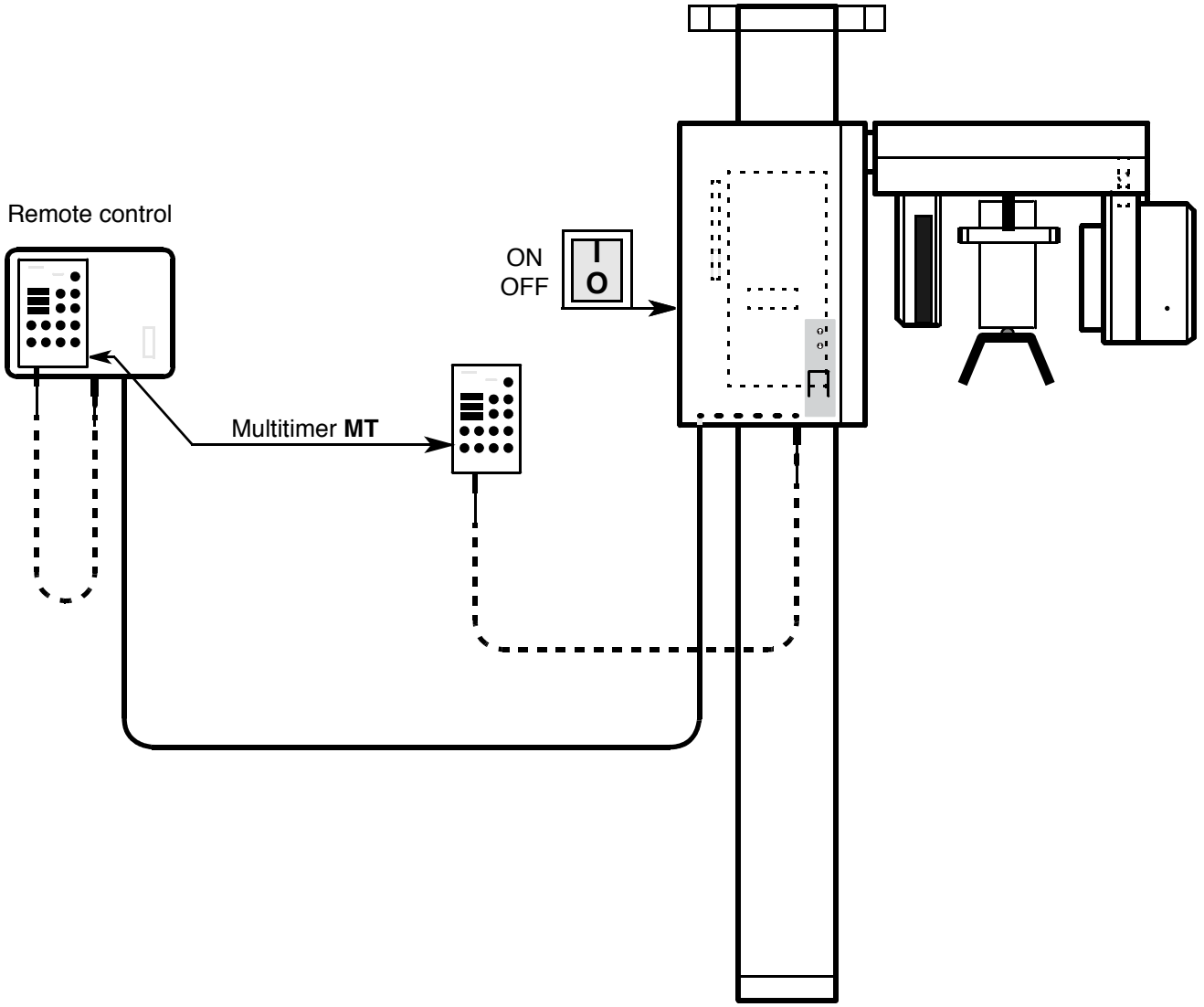
7. Select the kV step.

8. Select the exposure time. Permissible times are 0.1 to 4.0 seconds.

9. Switch **RADIATION** on.
The actual radiation time is indicated after releasing the exposure button.
If an exposure is released during the cool-down period, the elapsing cool-down time is displayed (automatic exposure blockage). During this time the LED above the R key flashes.
Acknowledge the radiation time with the R key.



5.4 Service routine S.02 Radiation without rotation for Ceph


Remote control
ON
OFF
I
O
Multitimer **MT**

- **The setpoints for kV, mA and preheating VH can be checked with Service routine S.03.**

  Additionally with ORTHOPHOS DS: set readiness for exposure as described in section **'Setting exposure readiness on the PC'**. Select **Factory service (2)**.
  or **set the Active signal internally with Service Routine S.35, test step 02.**
  ☝ see page 5 - 59.

1. Select Service routine **S.03** as described in section **'Selecting service routines'**.
2. Briefly press the service key. The mA display shows the step **01**.

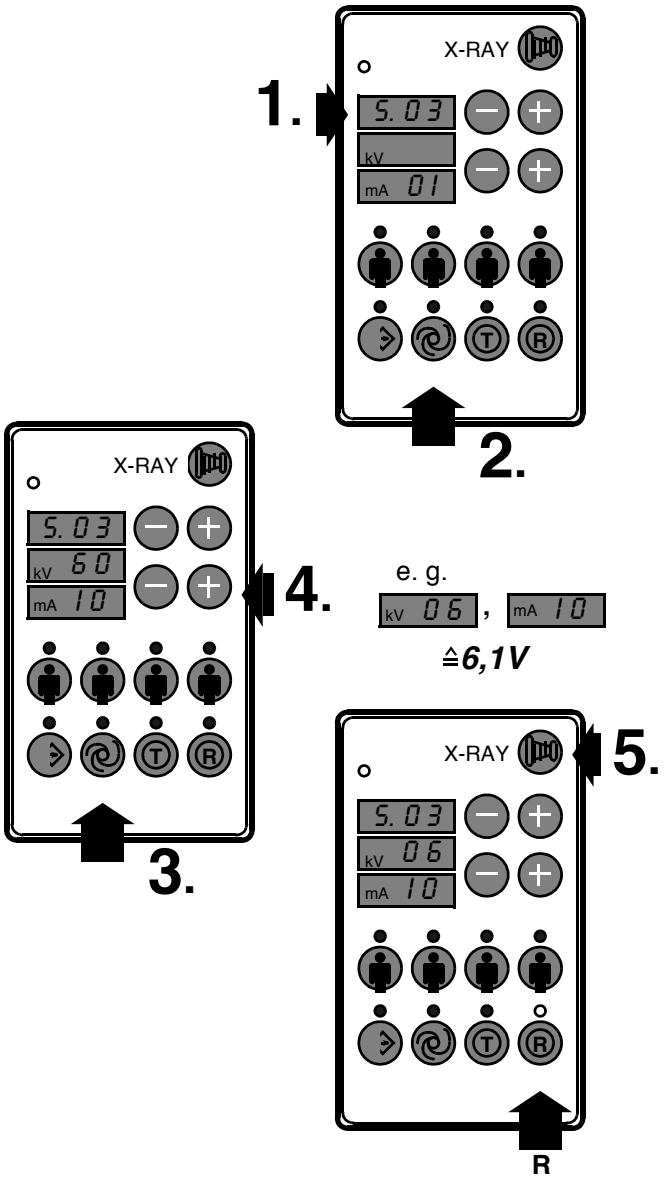
   The kV setpoint is checked **in test step 01**. **kV setpoints:** **6.0V**±0.1V ≙ **60kV**
   8.0V±0.2V ≙ **80kV**
3. Briefly press the service key. The values on the kV/mA display light up.
4. Set the kV value with the + key (example in figure: 60 kV).
5. Press the exposure button (hold it pressed; when releasing it the last value is displayed).
   The setpoint is displayed in four digits on the kV/mA display (example in figure: 06.10).
   The LED above the R key flashes. Press the R key; another kV value can now be tested. An audible signal may occur at the end of measurement.

- Briefly press the service key. The next test step appears.

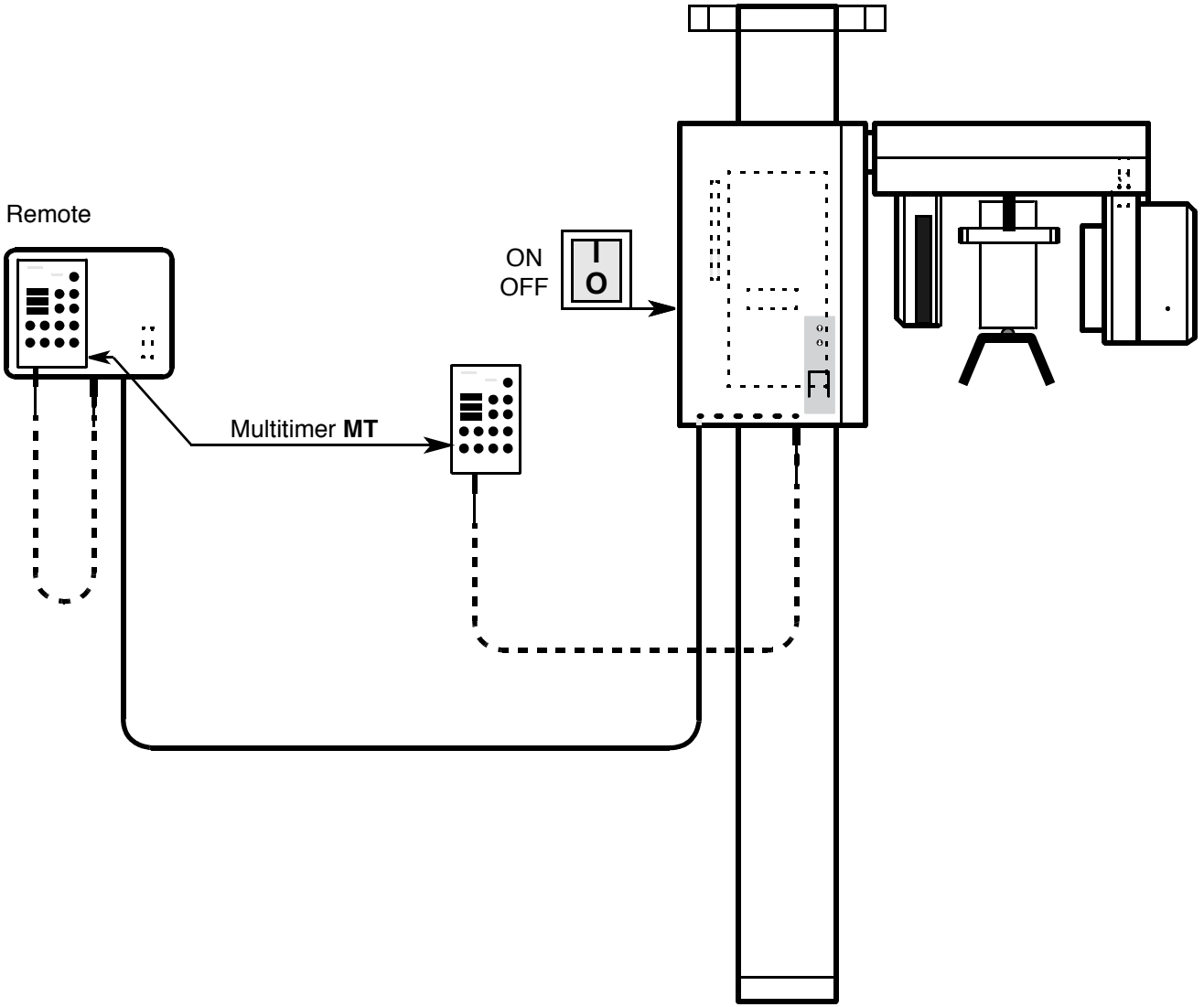
  The mA setpoint is checked **in test step 02**. **mA setpoint:** **5.0V**±0.5V ≙ **10mA**
- Briefly press the service key. The values on the kV/mA display light up.
- Press the exposure button (hold it pressed; when releasing it the last value is displayed).
  The mA setpoint is displayed in four digits on the kV/mA display.
- Briefly press the service key. The next test step appears.

  The VH setpoint is checked **in test step 03**. **VH setpoint:: 05.50**±0.40 bei **60kV/10mA**.
- Briefly press the service key. The values on the kV/mA display light up. Press the exposure button (hold it pressed; when releasing it the last value is displayed).
  The VH setpoint is displayed in four digits on the kV/mA display.
  VH-Sollwert: 05.10V bis 05.90V

Continued on next page



5.5 Service routine S.03 Setpoints: kV, mA, preheating


Remote
ON
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Multitimer **MT**

Continued

Setpoint alignment is executed automatically **in test step 04**.

6. Briefly press the service key. The memory LED flashes and the kV/mA display indicates **FF**.

Deleting the previous offsets:

7. Press the memory key (LED stops flashing). The LED above the R key flashes.
8. Press the Return key R (LED stops flashing). The LED above the service key lights up. The kV/mA display indicates **00**.
9. Briefly press the service key.
   The display for program / radiation time shows **S_1** and **00** on the kV display.
   The program is ready for the automatic setpoint alignment. (Pressing the service key at this point causes the test step to be exited with the offsets deleted.)

Performing the automatic setpoint alignment:

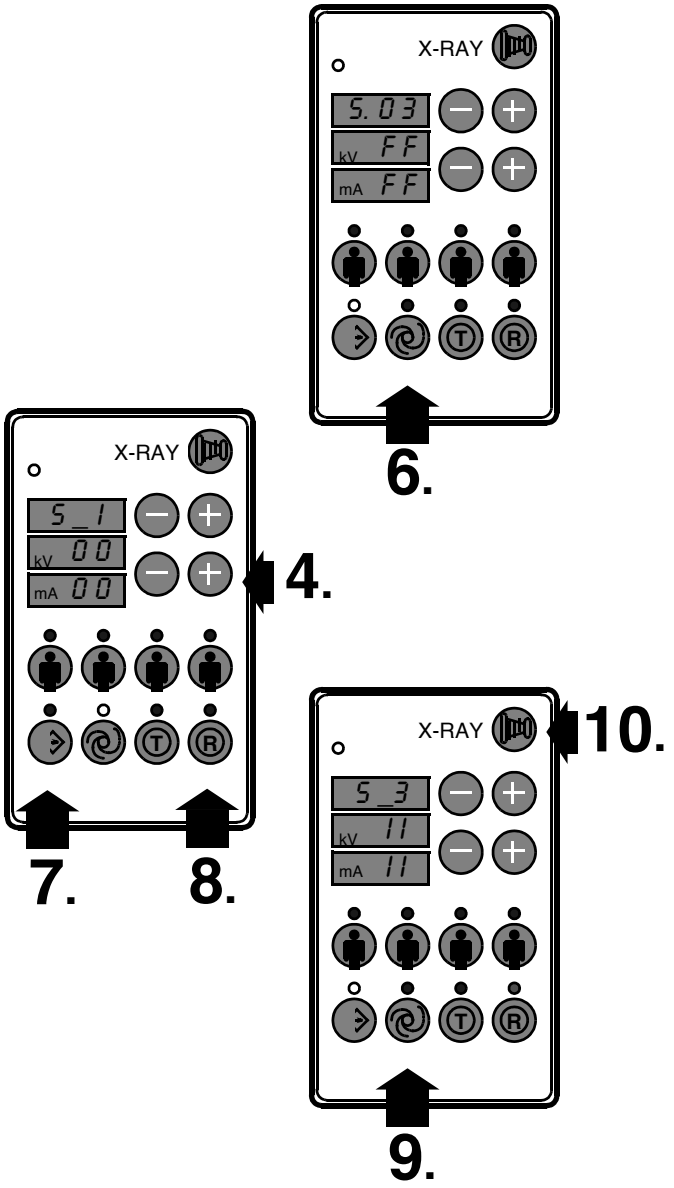
10. Press the exposure button and hold it pressed until **11 11** lights up on the kV/mA display and the LED above the memory key flashes.
    The alignment process is executed automatically.

Storing the alignment values:

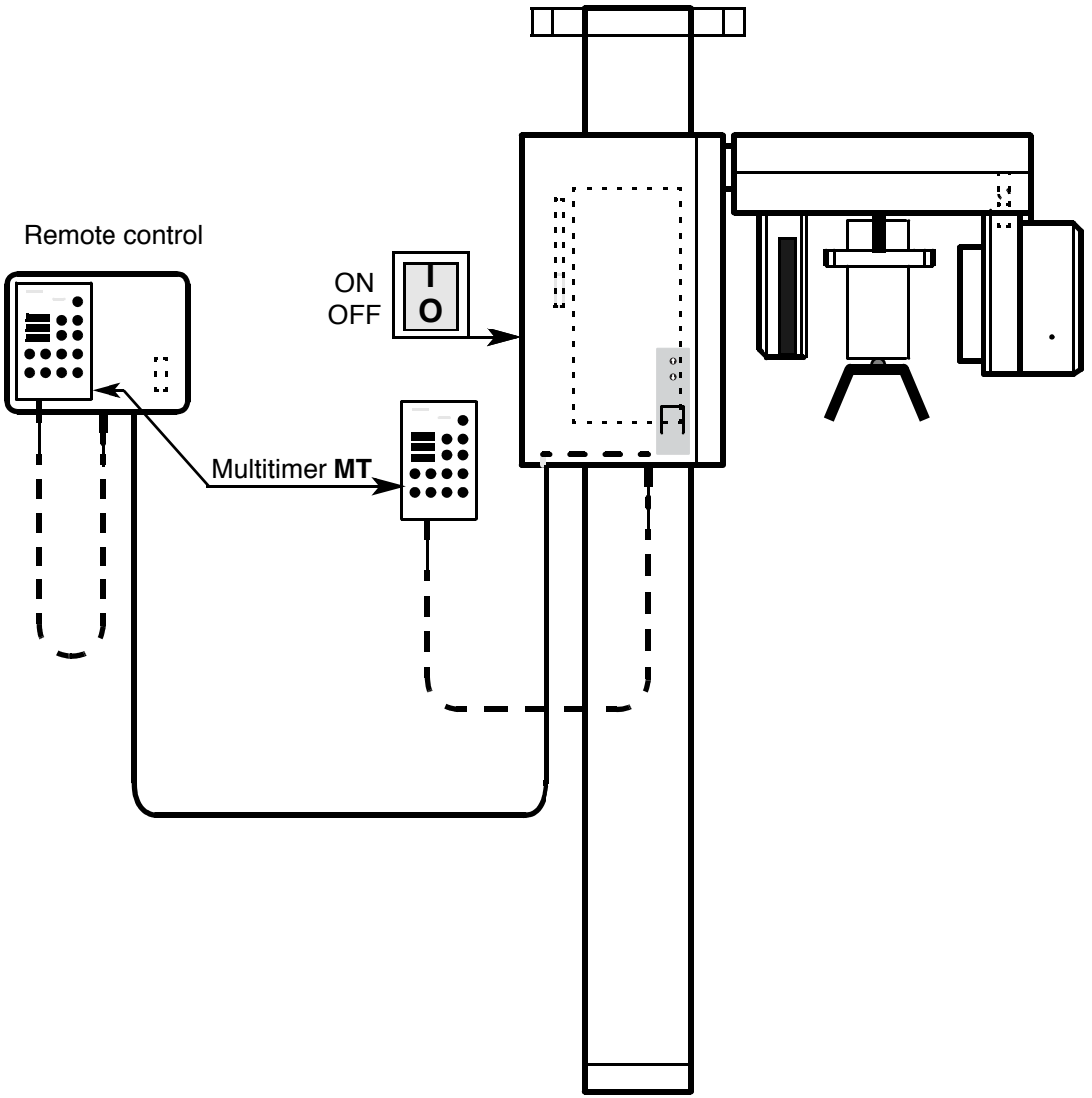
- Press the memory key (LED stops flashing). The LED above the R key flashes.
- Press the Return key R (LED stops flashing). The LED above the service key lights up.
- Press the service key.

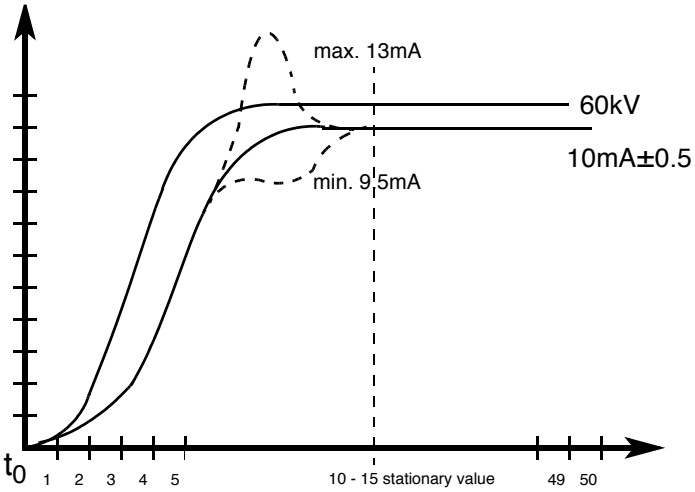
Information about the displays during the automatic alignment.

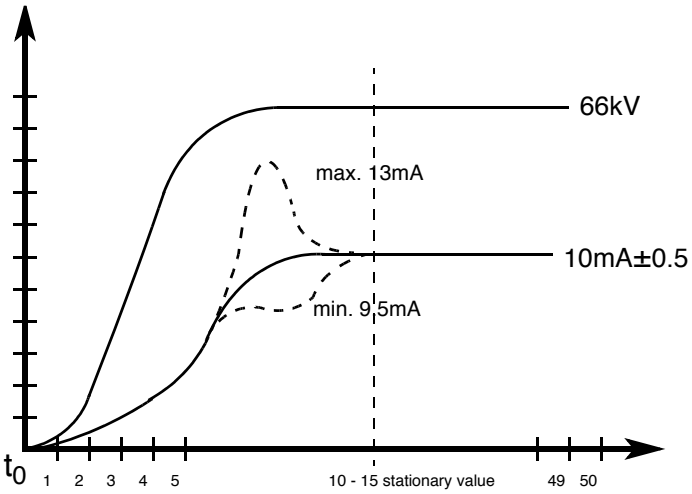
Program/radiation time display:	Step number of the currently active alignment parameter S_1: kV alignment is active S_2: mA alignment is active S_3: VH alignment is active
kV display:	Consecutive number of alignment attempts within the test step number.
kV/mA display:	Following the completed alignment within one test step, all kV/mA steps are selected one after the other and the error of the actual value is tested.



5.5 Service routine S.03 Setpoints: kV, mA, preheating







50 values are measured in intervals of 2 ms.
The measured values can be plotted as points to check the transient characteristics.

- **The actual values of kV, mA and preheating VH can be checked with Service routine S.04.**

Additionally with ORTHOPHOS DS: set readiness for exposure as described in section '**Setting exposure readiness on the PC**'. Select **Factory service (2)**.
or **set the Active signal internally with Service Routine S.35, test step 02.**
☝ see page 5 - 59.

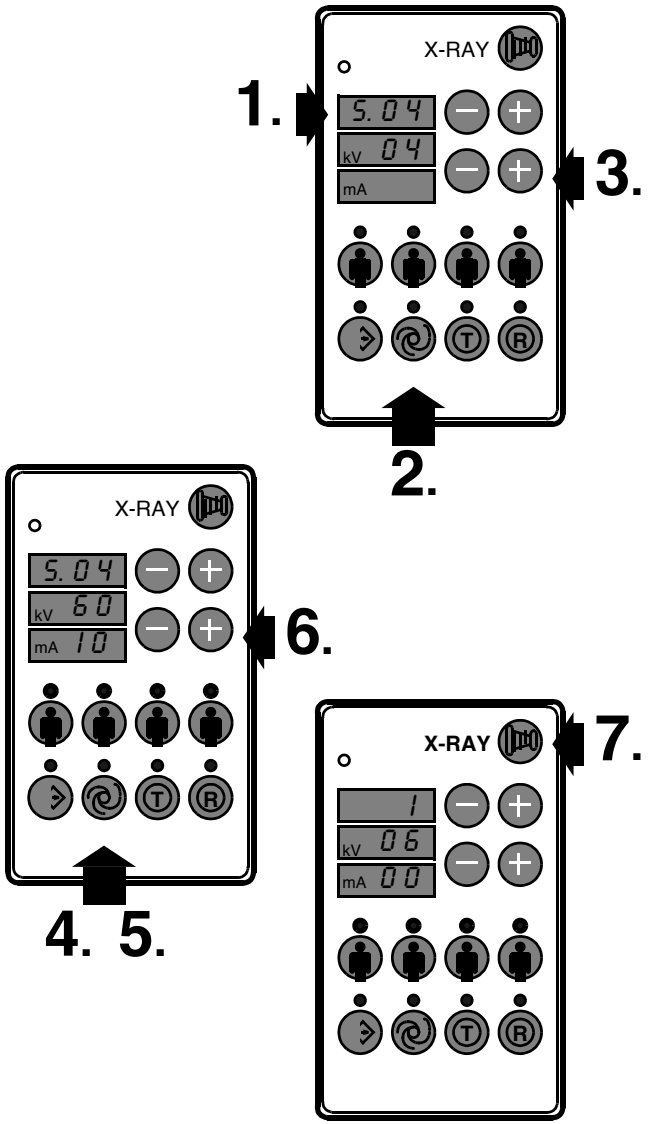
1. Select Service routine **S.04** as described in section **'Selecting service routines'**.
2. Briefly press the service key. The kV display indicates 00.
3. Enter service code **04** with the + key.
4. Briefly press the service key. Test step 01 is indicated on the mA display.

   The actual kV value is checked **in test step 01**. **kV actual value:** stationary kV value ± **0.20 V 06.00 V** ± 0.2 V ≙ **60 kV** after the tenth measured value.

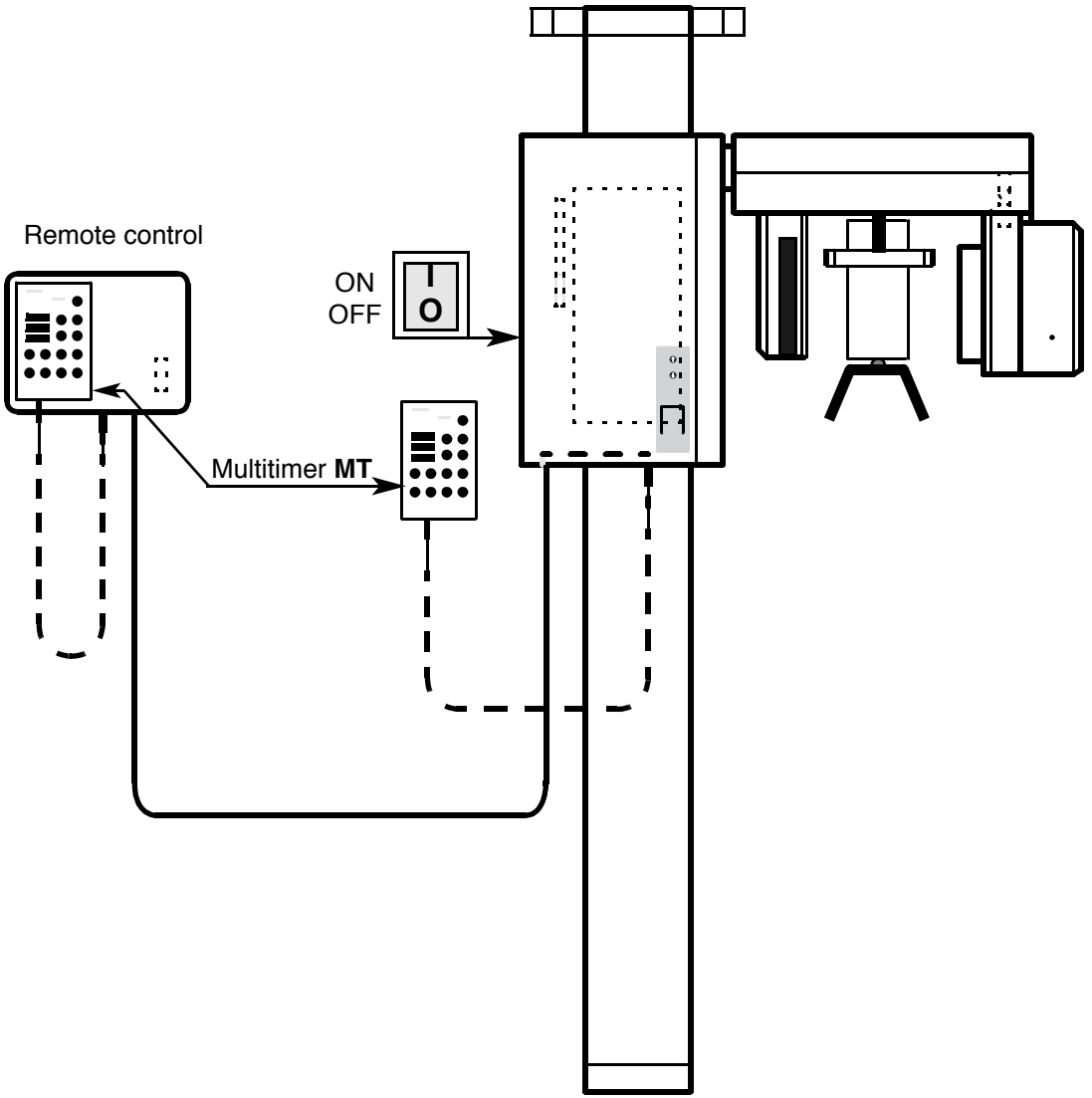
5. Briefly press the service key. The values on the kV/mA display flash. The LEDs above the patient symbol keys light up.
6. Select the kV value. Example in figure: 60kV/10mA
7. Press the exposure button and hold it pressed. **RADIATION** is generated for 0.1 second.

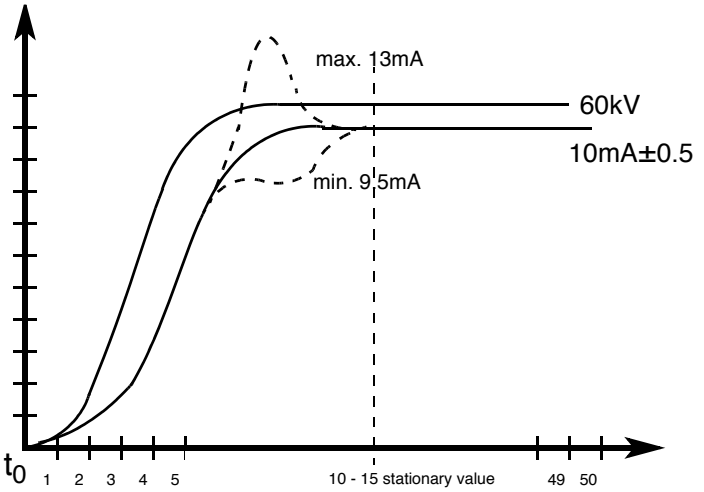
- The actual value is displayed in four digits on the kV/mA display:
  Example in figure **06.00 V** ± 0.2 V ≙ **60 kV** after the tenth measured value.
  The stationary value is: ± 0.20 V.
- A maximum of 50 measured values can be recalled with the **–** / **+** (kV) keys.
  An additional kV value can be entered for the test after pressing the R key.
- Briefly press the service key. The next test step appears.

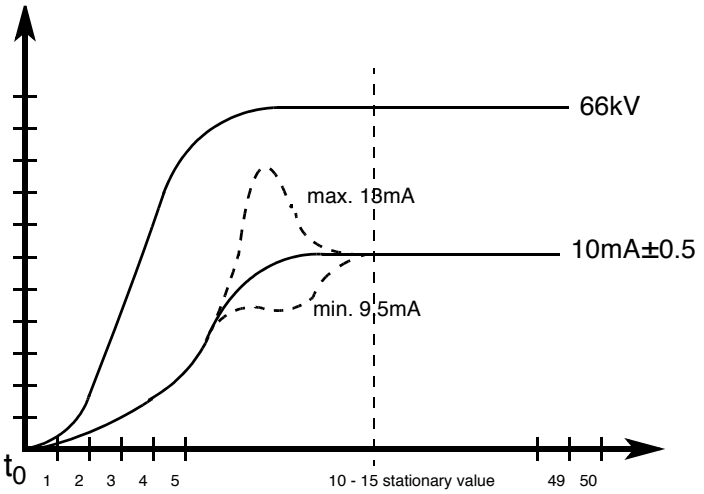
Continued on next page



5.6 Service routine S.04 Actual values: kV, mA, preheating







50 values are measured in intervals of 2 ms.
The measured values can be plotted as points to check the transient characteristics

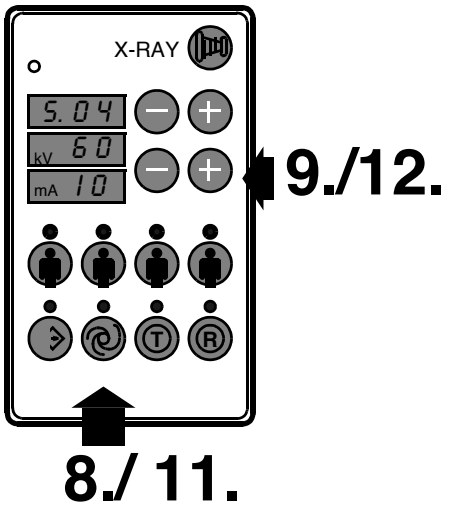
Continued

The actual mA value is checked **in test step 02**.

8. Briefly press the service key. The values on the kV/mA display flash. The LEDs above the patient symbol keys light up.

9. Select the kV value. Example in figure: 60kV/10mA

10. Press the exposure button and hold it pressed. **RADIATION** is generated for 0.1 seconds.



- The actual value is displayed in four digits on the kV/mA display:
  After the 10th measured value: **actual mA value 5.0 V** ± 0.1V ≙ **10mA** ± 0.2 mA.
  Check again with 66kV/10mA (5.0 V ± 0.1 V ≙ 10 mA ± 0.2 mA)
- A maximum of 50 measured values can be recalled with the -/+ (kV) keys.
  An additional kV value can be entered for testing after pressing the R key.

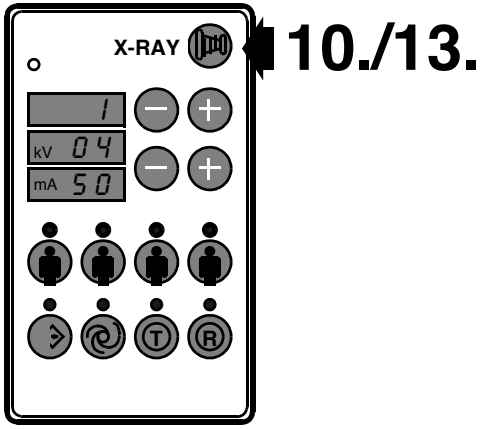
  If you do not wish to check any more mA actual values, briefly press the service key.
  The next test step then appears.

The actual VH value is checked **in test step 03**. **VH actual value:** stationary setpoint ± **0.30V.**

11. Then briefly press the service key. The values on the kV/mA display flash. The LEDs above the patient symbol keys light up.

12. Select the kV value. Example in figure: 60kV/10mA

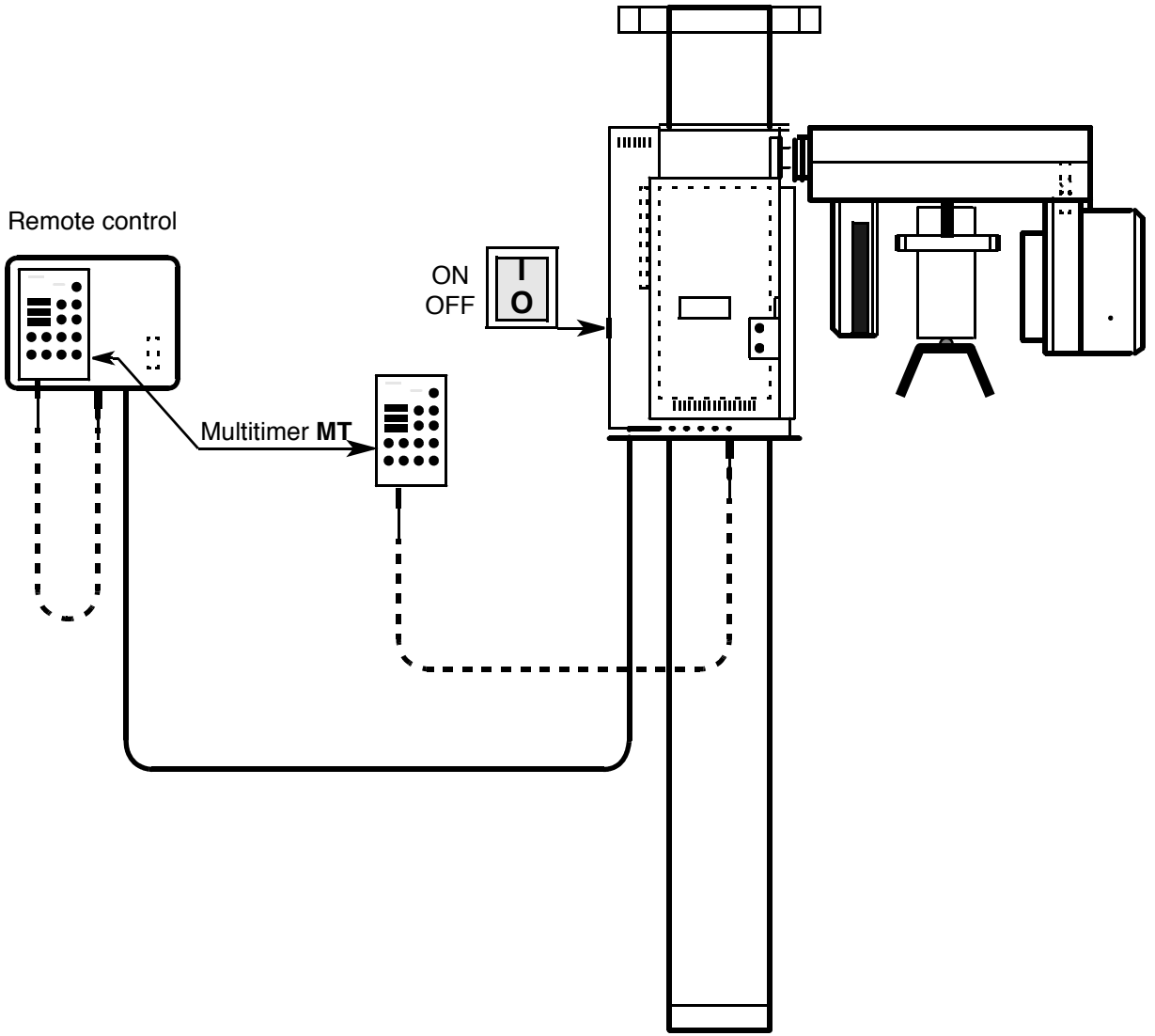
13. Press the exposure button and hold it pressed. **RADIATION** is generated for 0.1 second.



- The actual value is displayed in four digits on the kV/mA display:
  VH actual value: 05.20 to 05.80 (at setpoint 05.50) after the 25th measured value.
- A maximum of 50 measuring values can be recalled with the -/+ (kV) keys.
  An additional kV value can be entered for the test after pressing the R key.

  If you do not wish to check any more VH actual values, briefly press the service key.
  Test step 01 appears again.

5.6 Service routine S.04 Actual values: kV, mA, preheating


Remote control
ON
OFF
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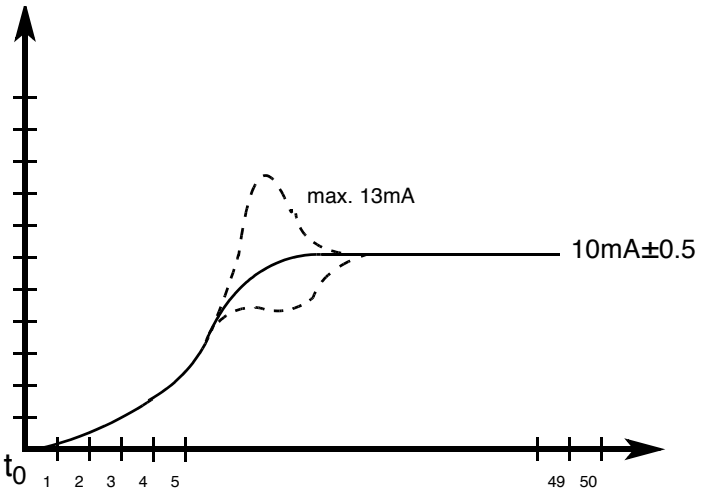
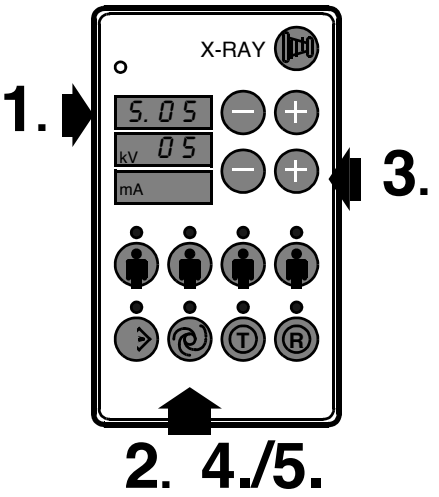
Multitimer **MT**


max. 13mA
10mA±0.5
t_0
1
2
3
4
5
49
50

- **Service routine S.5 is needed for the heating adjustment.**

  Additionally with ORTHOPHOS DS: set readiness for exposure as described in section **'Setting exposure readiness on the PC'**. Select **Factory service (2)**.
  or **set the Active signal internally with Service Routine S.35, test step 02.**
  ☝ see page 5 - 59.



1. Select Service routine **S.05** as described in section **'Selecting service routines'**.
2. Then briefly press the service key. The kV display indicates **00**.
3. Enter the service code **05**. The kV display indicates **05**.
4. Briefly press the service key. Test step 01 is shown on the mA display.
5. Briefly press the service key twice. Test step 02 is shown on the mA display.

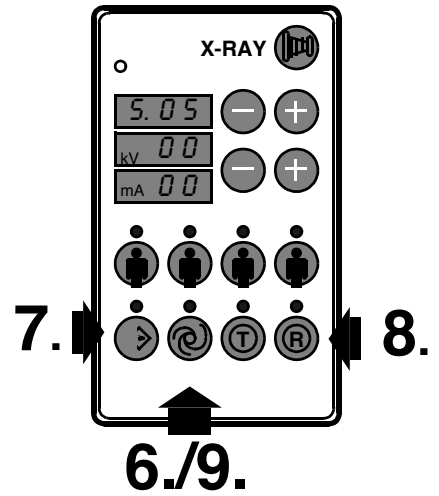
Test step 02

- Preheating is automatically adjusted with service routine **S.05**, test step **02**.
  Do not perform this test step before warmup.

6. Briefly press the service key.
   FF FF appears on the kV/mA display. The LED above the memory key flashes.

Deletion of previous offset:

7. Press the memory key. The LED above the R key flashes.
8. Press the Return key R. The kV/mA display indicates **00 00**.
   The LED above the service key lights up.
9. Briefly press the service key. **60/10** flashes on the kV/mA display.
   The program is now ready for the automatic VH adjustment (pressing the service key again at this point causes the test step to be exited with the offsets deleted).



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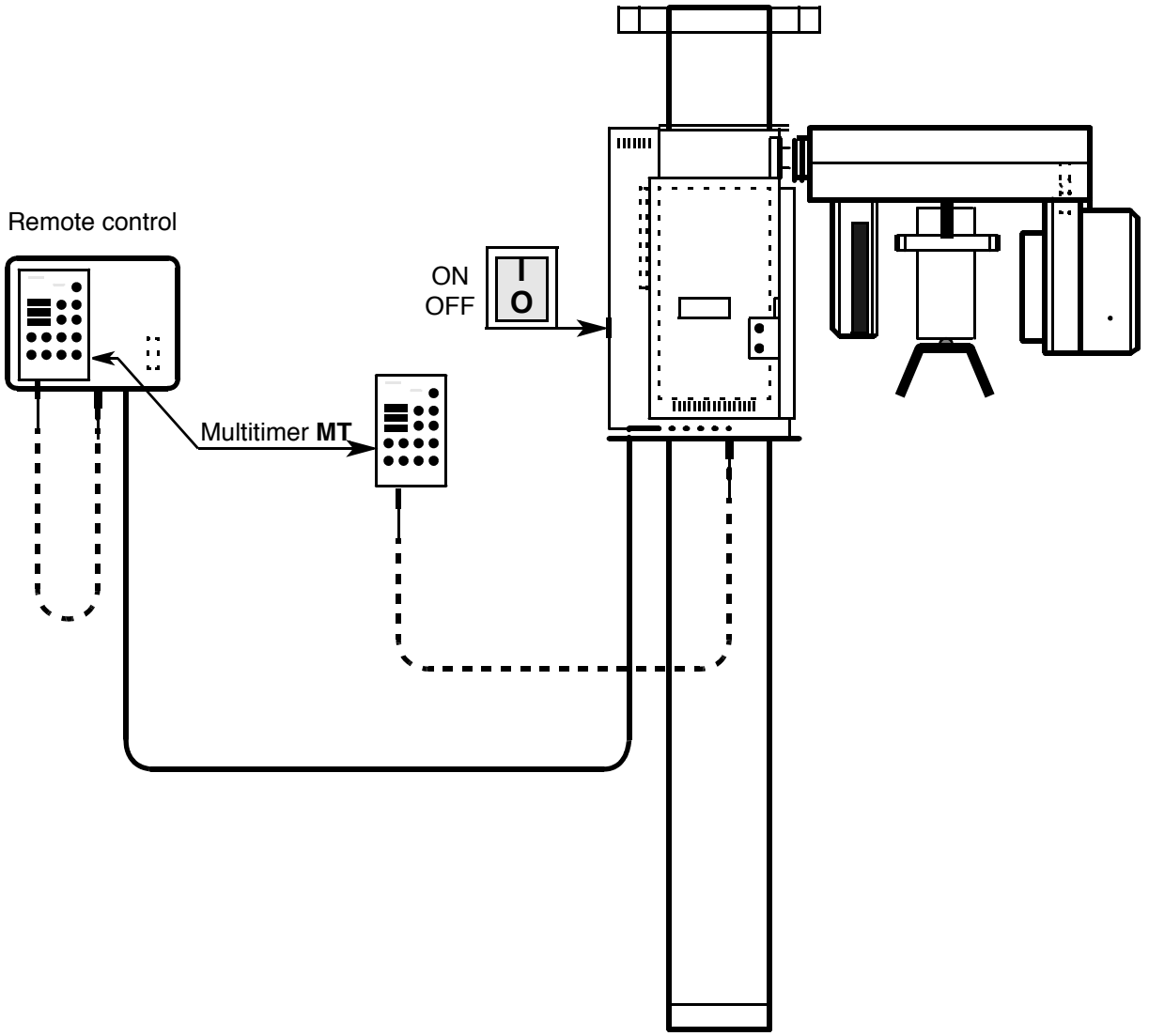
5.7 Service routine S.05 Heating adjustment


Remote control
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OFF
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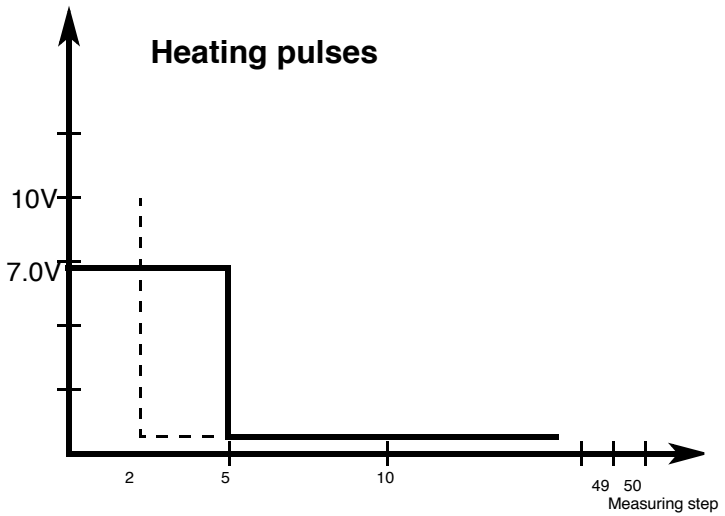
Multitimer **MT**


Heating pulses
10V
7.0V
2
5
10
49
50
Measuring step

Continued

Performing the automatic setpoint alignment:

10. Press the X-ray key and hold it pressed until the kV/mA display shows **0510 - 05 90**, and the LED above the memory key flashes.
The alignment process is executed automatically.
The following takes place during the alignment:

Starting with 1 second **RADIATION** to warm up the system there are several exposure releases with 100 msec radiation time each in order to optimize the preheating value.
The cool-down intervals between radiation phases are indicated on the mA display, and the number of optimizing steps is indicated on the program/radiation time display.

Storing the alignment values:

11. Press the memory key (LED stops flashing). The LED above the R key flashes.

12. Press the Return key R (LED stops flashing). The LED above the service key lights up.

13. Press the service key . The preheating value is now stored.

Test step 03

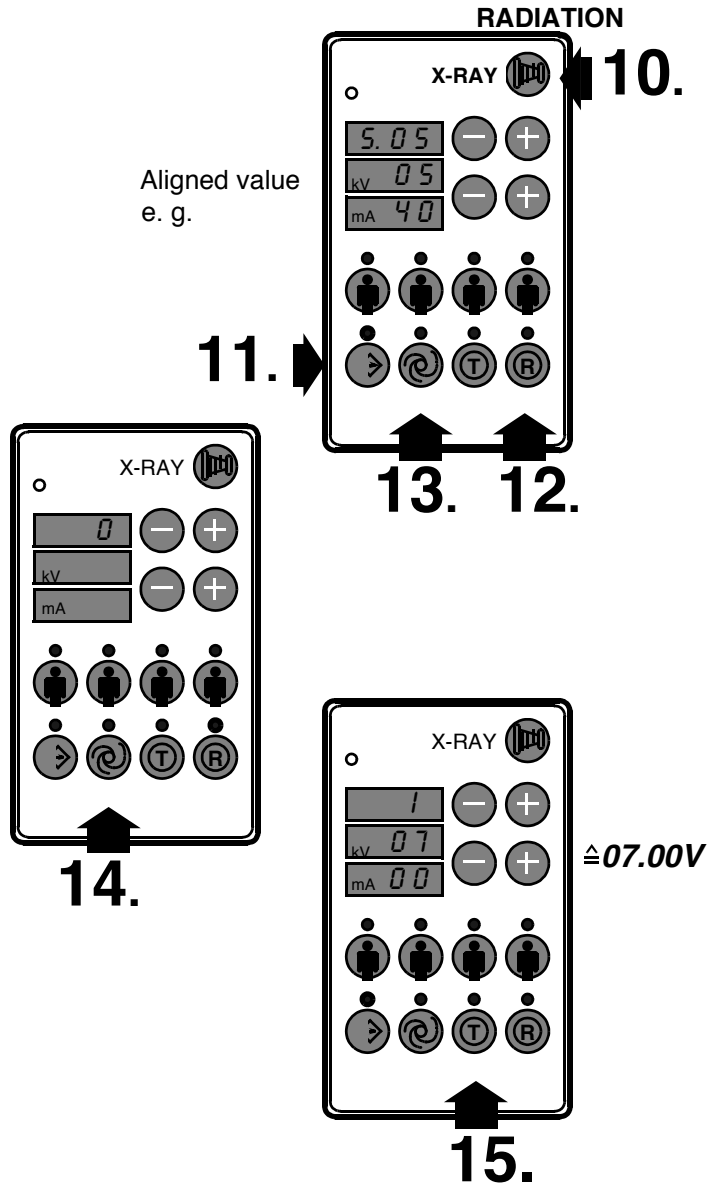
- Basic heating is checked with Service routine **S.05**, test step **03**.

14. Briefly press the service key .
The program/radiation time display indicates **0**. The LED above the test rotation key lights up.

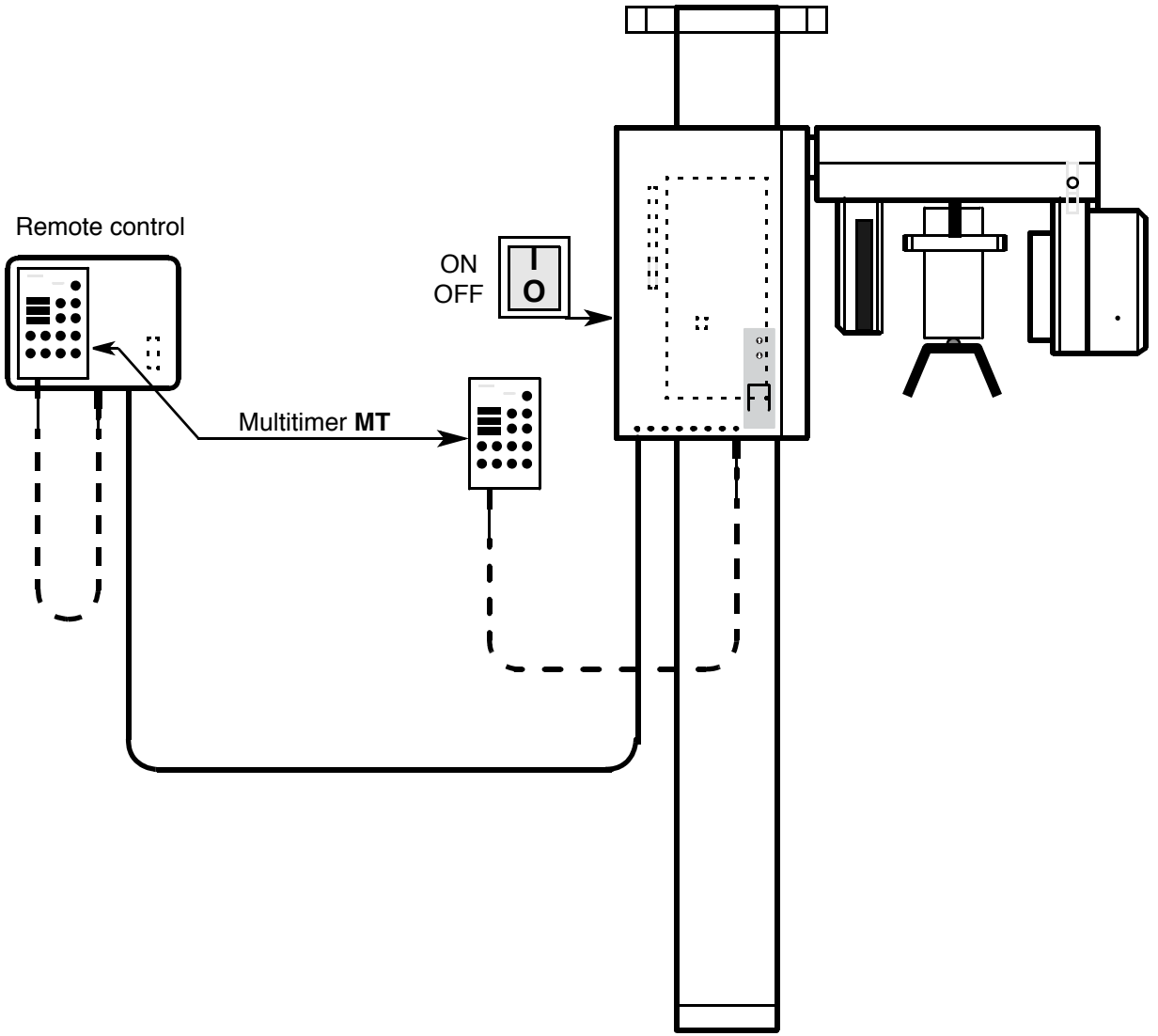
15. Press the test rotation key.

After pressing the test rotation key, the following indications may appear:

- The program/radiation time display indicates **1**, and the kV/mA display shows the voltage value.
Ten voltage values can be called up with the kV/mA +/- keys (pulse sequence of basic heating).
The first two measurements must be approximately **7.0V**, while the voltage must be about **0.0V** after the fifth measured value at the latest.
If this change of signal is not clearly visible, the basic heating is faulty.
- The program/radiation time display indicates **0**, and the mA display shows **00**.
The VH actual signal remains on low level - basic heating is faulty.
- The program/radiation time display indicates **0**, and the mA display shows **11**.
The VH actual signal remains on high level - basic heating is faulty..



5.7 Service routine S.05 Heating adjustment


Remote control
ON
OFF
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Multitimer **MT**

- **The number of radiation releases can be determined with Service routine S.06.**

1. Select Service routine **S.06** as described in section **'Selecting service routines'**.
2. Briefly press the service key. The kV display indicates 00.
3. Enter the service code **06** with the + key.
4. Briefly press the service key.
   Test step 01 appears on the mA display.
5. Briefly press the service key. The memory LED flashes.
   The present count (max. 65535) is indicated on the program/kV/mA display.
6. Briefly press the service key. The next test step appears.

   NOTE: Other test steps can be selected with the kV +/- keys.

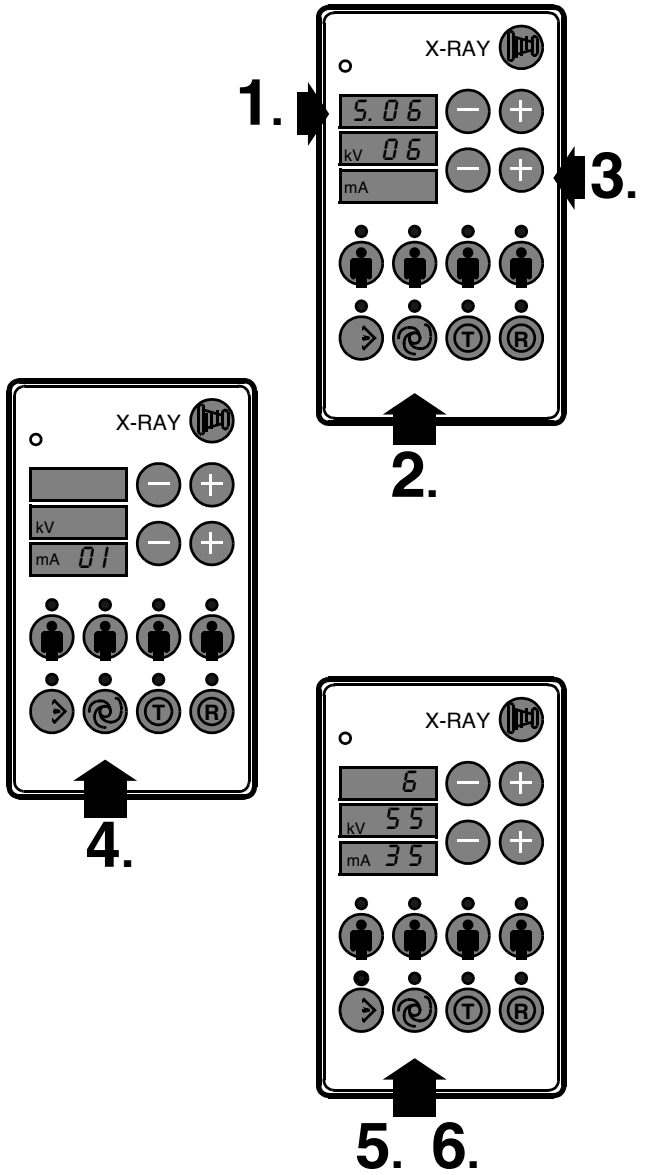
- Press the memory key to reset the counter, the R LED flashes (with memory card versions > V26). Press the Return key R. The display shows 00.

  The Pan exposure counter is displayed **in test step 01**.

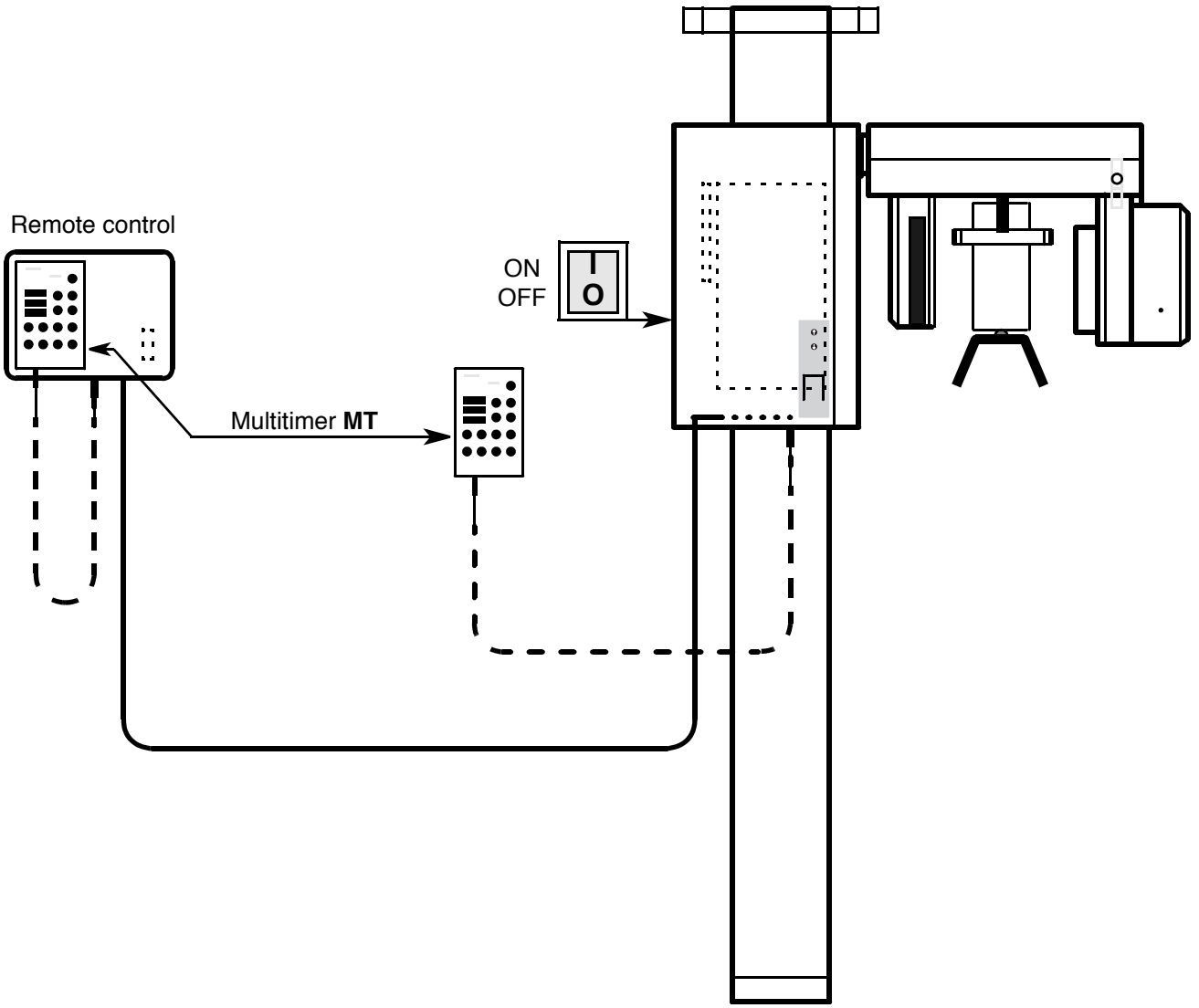
  The Ceph exposure counter is displayed **in test step 02**.

  The total of all radiation releases is displayed **in test step 03** (including service exposures).

  The total of all rotations is displayed **in test step 04**.

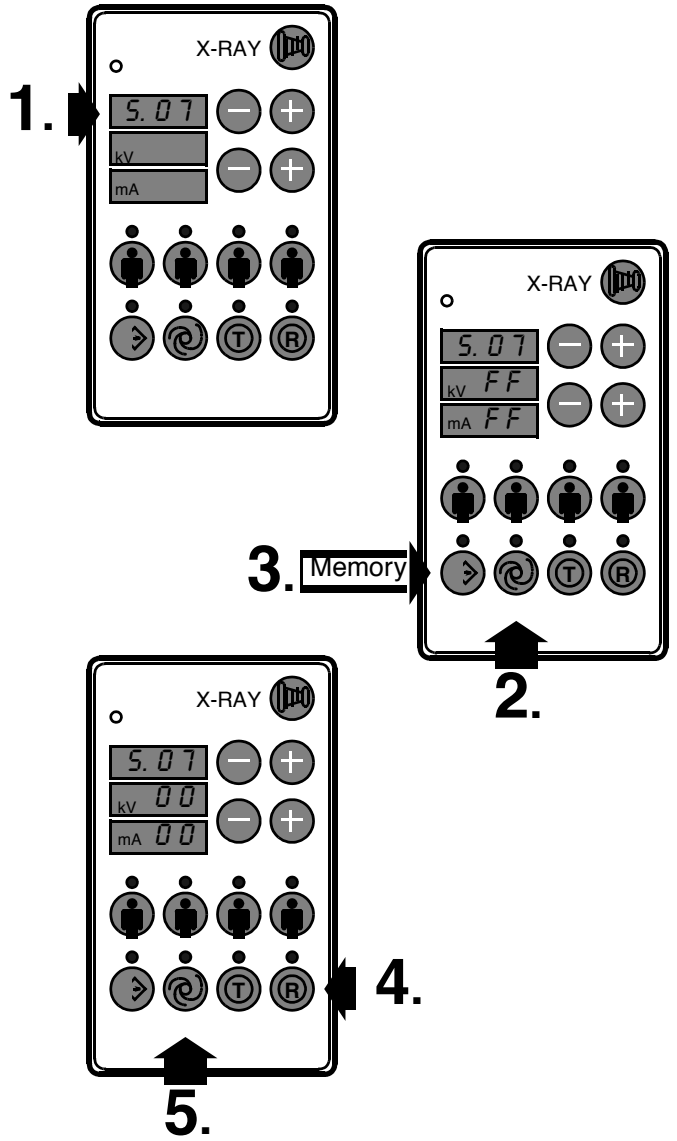


5.8 Service routine S.06 Radiation counter (decimal display)

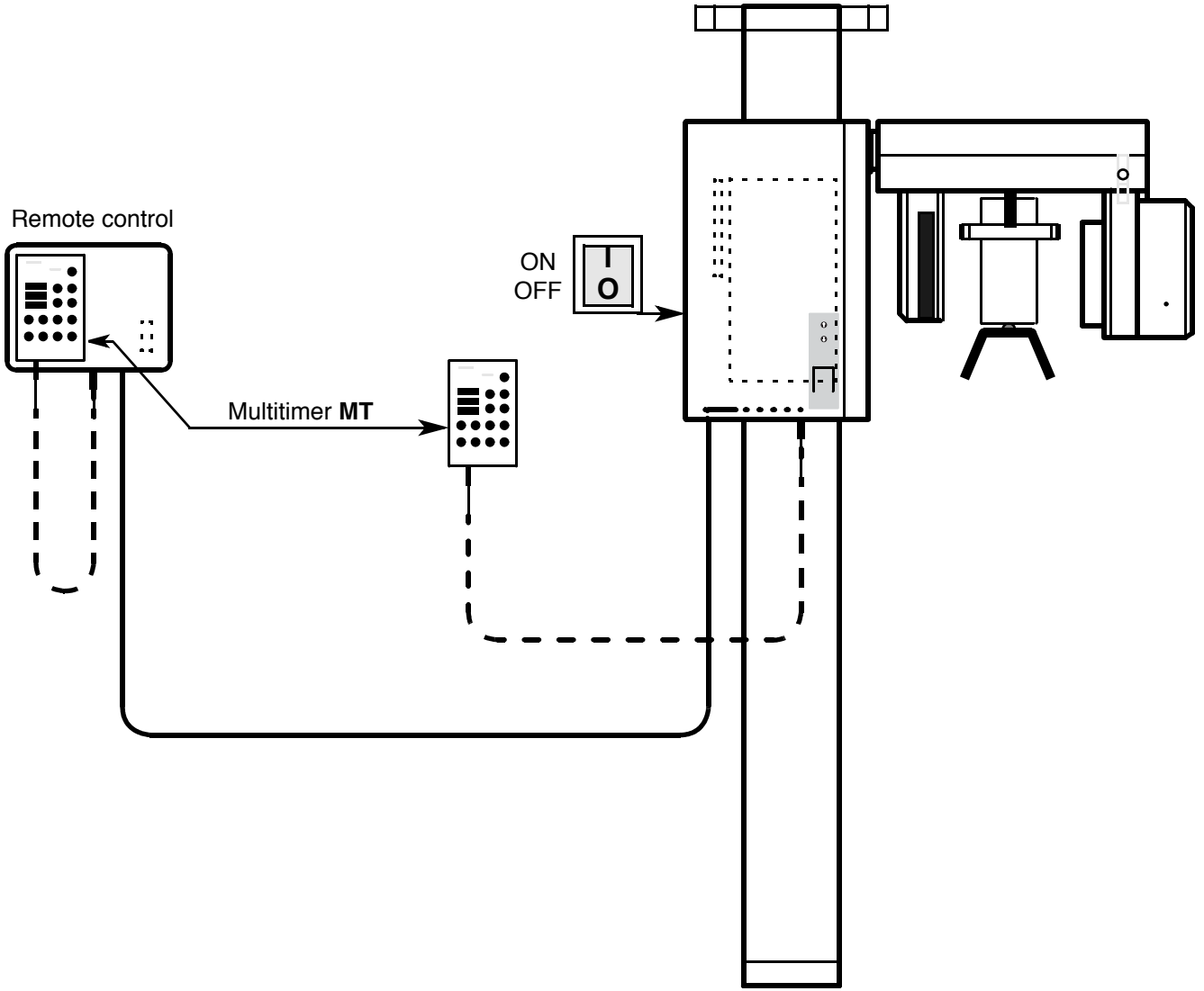

Remote control
ON
OFF
I
O
Multitimer **MT**

- **The Service routine S.07 is used to erase the contents of the EEPROM error memory on board DX1 after the X-ray tube assembly has been replaced.**

1. Select Service routine **S.07** as described in section **'Selecting service routines'**.
2. Briefly press the service key .
   FF FF is indicated on the kV/mA display.
   The LED above the memory key flashes.
3. Press the memory key.
   The LED above the R key flashes.
4. Press the Return key R.
   With Service routine **S.07** the error memory is erased.
   The kV/mA display indicates **00 00**.
   The LED above the service key lights up.
5. Briefly press the service key . This completes the test.



5.9 Service routine S.07 Erasing the error memory


Remote control
ON
OFF
I
O
Multitimer **MT**

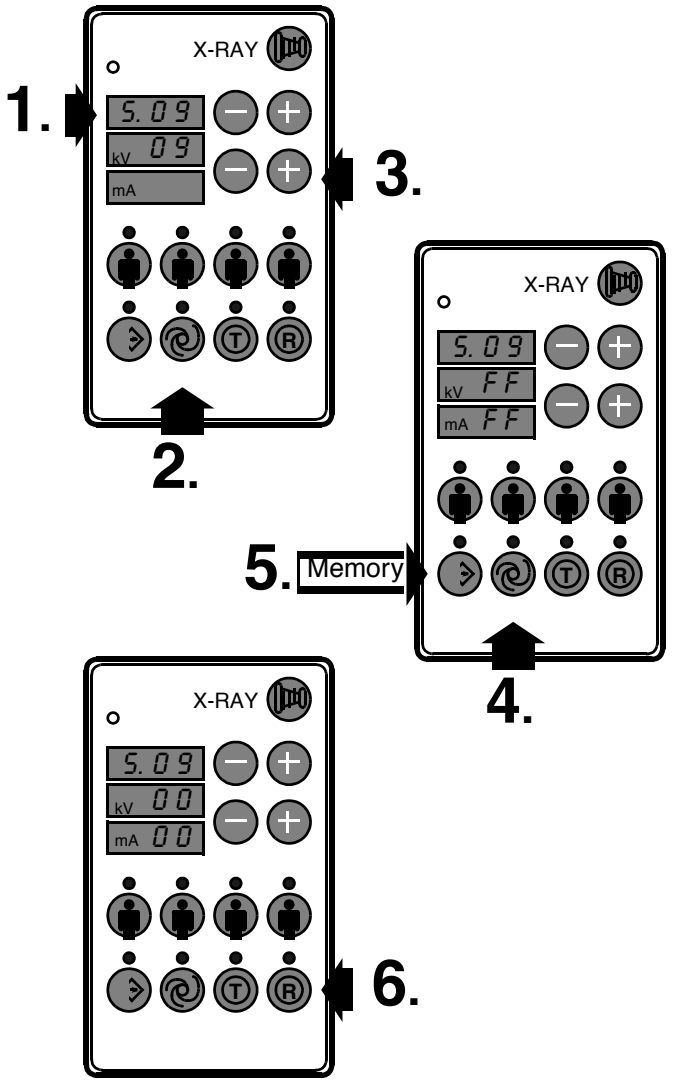
- **The service routine S.09 is used to erase all data programmed in the EEPROM on board DX1.**

1. Select Service routine **S.09** as described in section **'Selecting service routines'**.
2. Briefly press the service key .
   The kV display indicates **00**.
3. Enter the service code **09**.
   The kV display indicates **09**.
4. Briefly press the service key .
   FF FF appears on the kV/mA display.
   The LED above the memory key flashes.
5. Press the memory key.
   The LED above the key R flashes.
6. Press the Return key R.
   With Service routine **S.09** all programmed data contained in the EEPROM are erased. **00 00** is shown on the kV/mA display.
   The LED above the service key lights up.

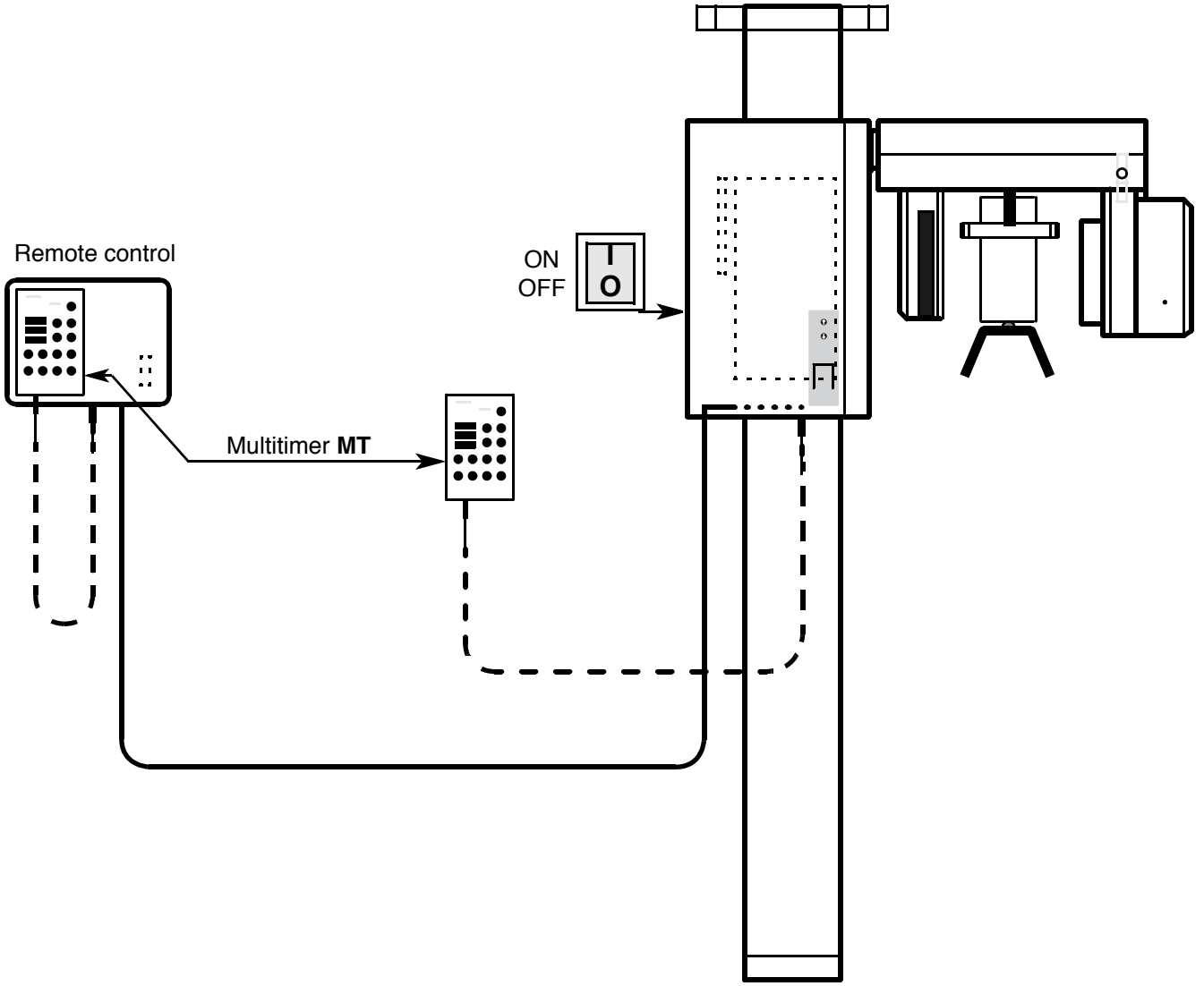
- Then briefly press the service key . This completes the test.

NOTE:

With Service routine S.09 all preset values in the EEPROM will be lost → Readjust DX1.



5.10 Service routine S.09 Erasing EEPROM DX1

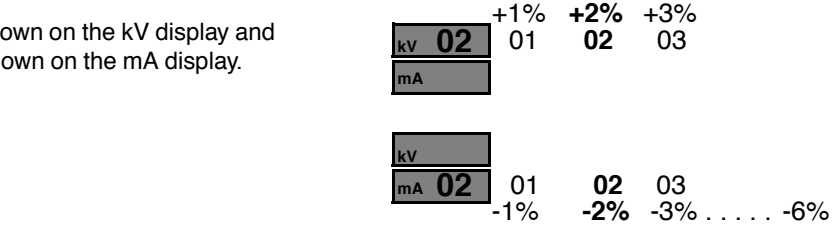

Remote control
ON
OFF
I
O
Multitimer **MT**

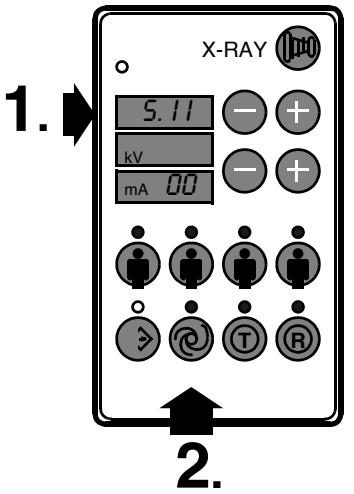
- **Service routine S.11 is used to adjust the kV increase in the spinal region for Panorama radiography.**

1. Select Service routine **S.11** as described in section **'Selecting service routines'**.

2. Briefly press the service key .
The memory LED flashes.
The preset correction value for the kV increase appears on the kV or the mA display. The factory setting is **00** on the mA display.

3. Set the kV increase correction value in percent steps within ranges of +3 % and -6 % using the kV +/- keys.
The positive % value is shown on the kV display and the negative % value is shown on the mA display.



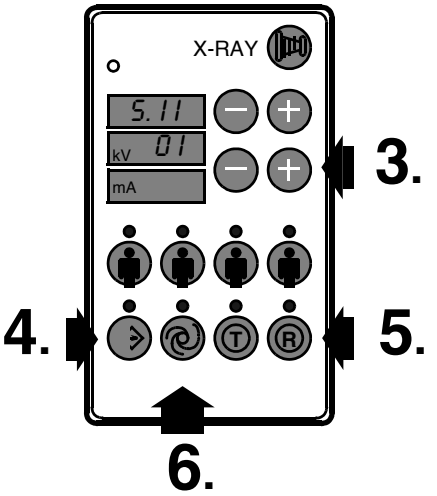


Programming the kV increase correction value:

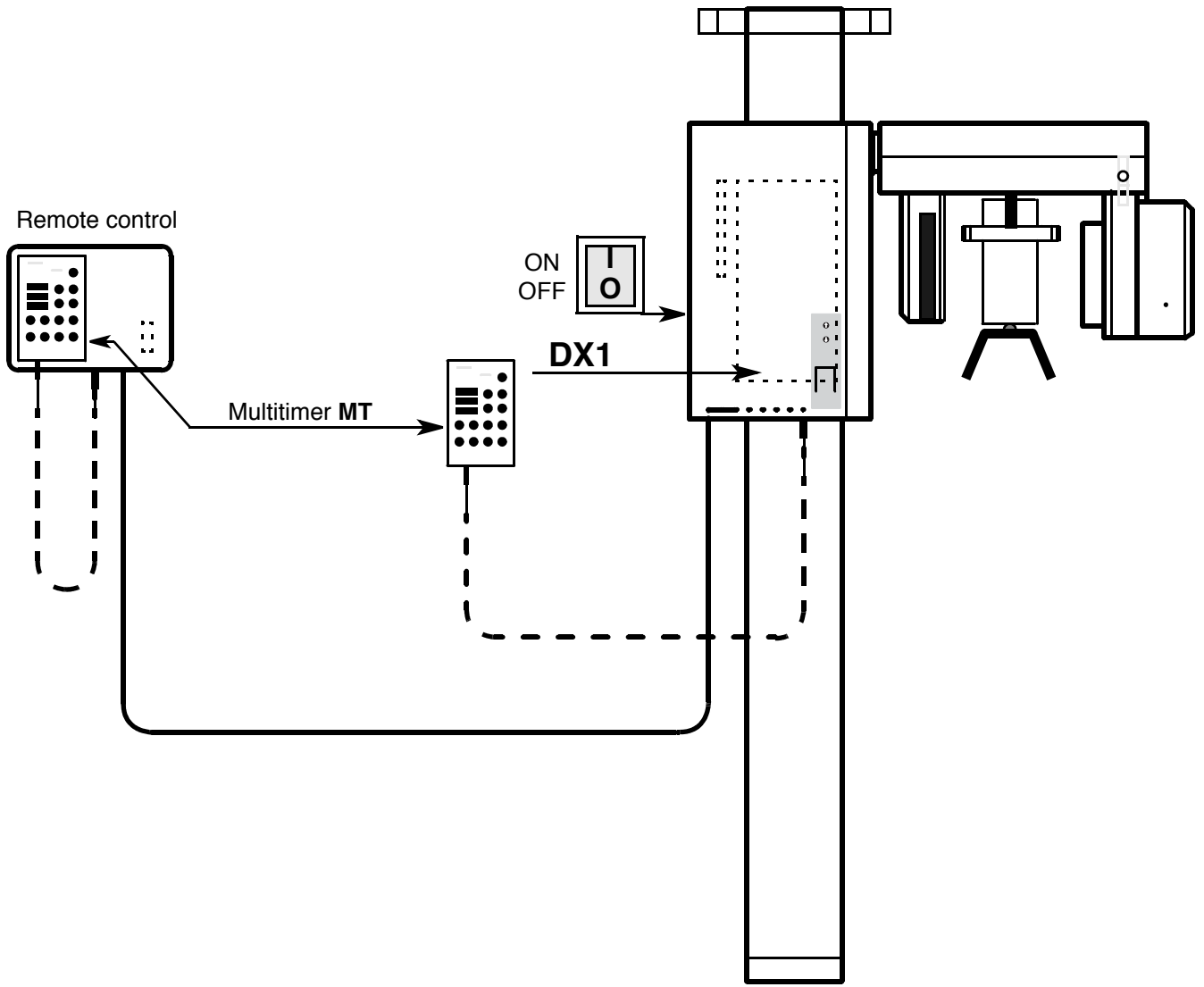
4. Press the memory key (LED stops flashing).
The LED above the R key flashes.

5. Press the Return key R (LED stops flashing).

6. Press the service key .



5.11 Service routine S.11 Setting the kV increase correction value for Panorama radiography


Remote control
ON
OFF
DX1
Multitimer **MT**

- **The input signals to board DX1 can be tested with Service routine S.13.**
- Turn the unit off. **Unplug** connectors **X4, X5, X7, X8, X9, X23** and **X25** from board **DX1** (if present). Connectors X1, X2, X3 and X10 must remain connected.
  Turn the unit on again. Pull out plug X6 (must be pulled out while system is running, otherwise HV installation help is released).
- Acknowledge the error message by pressing the R key on the multitimer.

1. Select Service routine **S.13** as described in section **'Selecting service routines'**.

2. Briefly press the service key . The mA display indicates test step 01.

The input signals to board DX1 are checked **in test step 01**.

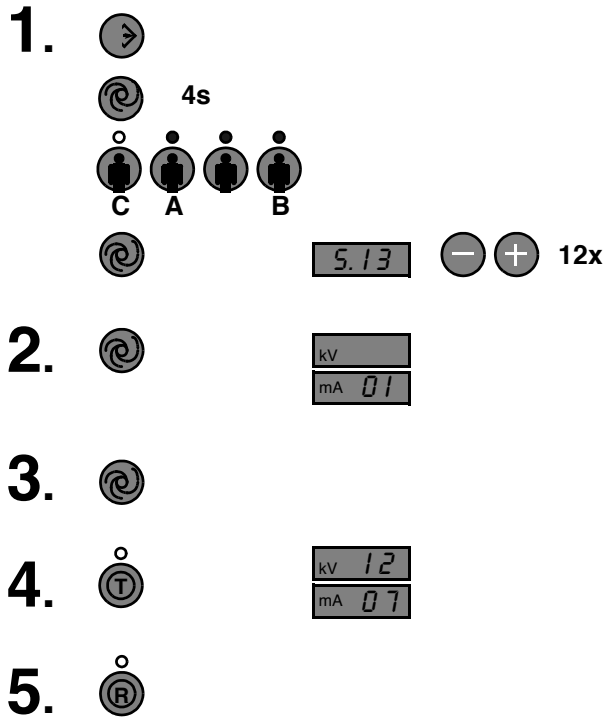
3. Briefly press the service key .
The test LED lights up.

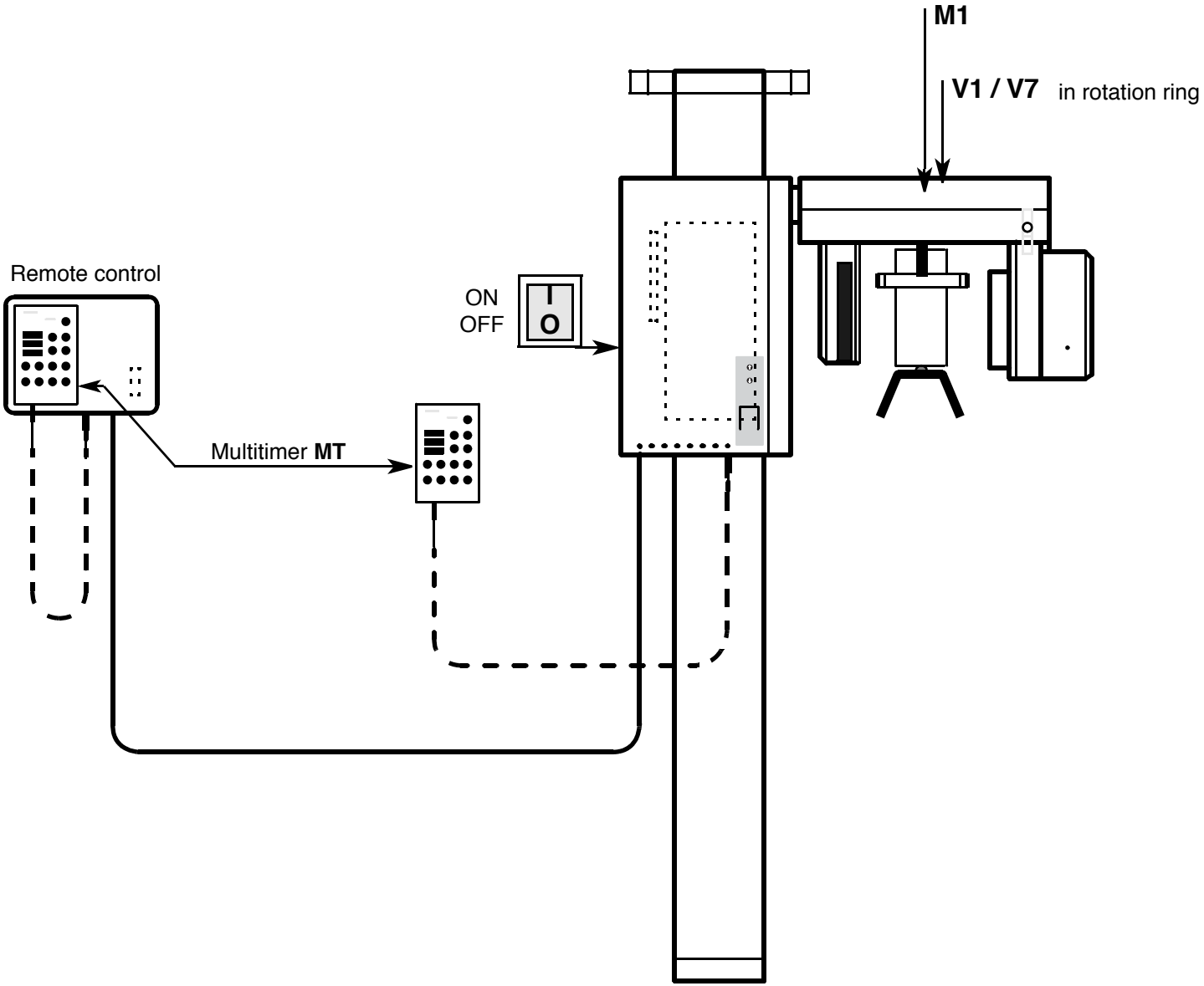
4. Press the test key.
The R LED flashes.
All inputs are tested for their status with all connectors unplugged. A faulty input status is indicated with its IN number and pin number. The errors can be subsequently recalled using the +/- keys of the kV/mA displays.
kV display = IN number (input)
mA display = pin number
If no error is detected, the kV/mA displays indicate 00. For all error indications not contained in the table, please contact your customer service.

Error indication IN Pin	Signal
10 30	Active
12 06	Cassette reference point
12 07	Cassette Pan position
12 08	Cassette Ceph position

5. Press the **R** key to terminate the error indication.

6. Turn the unit off and reconnect all connectors.




M1
V1 / V7 in rotation ring
Remote control
ON
OFF
I
O
Multitimer **MT**

- **Certain rotation functions are checked with Service routine S.14.**

1. Select Service Routine **S.14** as described in section **'Selecting service routines'**.

2. Briefly press the service key .
The mA display indicates **01**.

The **rotation functions** are tested for **Panorama mode in test step 01**.

3. Briefly press the service key .
AA is indicated on the mA display (with the X-ray tube assembly in the start position).

- If the X-ray tube assembly is not in the start position, the LED above the R key flashes. In this case press the Return key R. The X-ray tube assembly travels to the start position and the LED turns off. **AA** lights up on the mA display.
- If the X-ray tube assembly does not travel to the start position, error message **E3 33** is displayed after about 16 seconds. Proceed according to section **'Correction error of message E3 33',** see page 3 - 53.

4. Briefly press the service key .
The mA display indicates test step **02**.

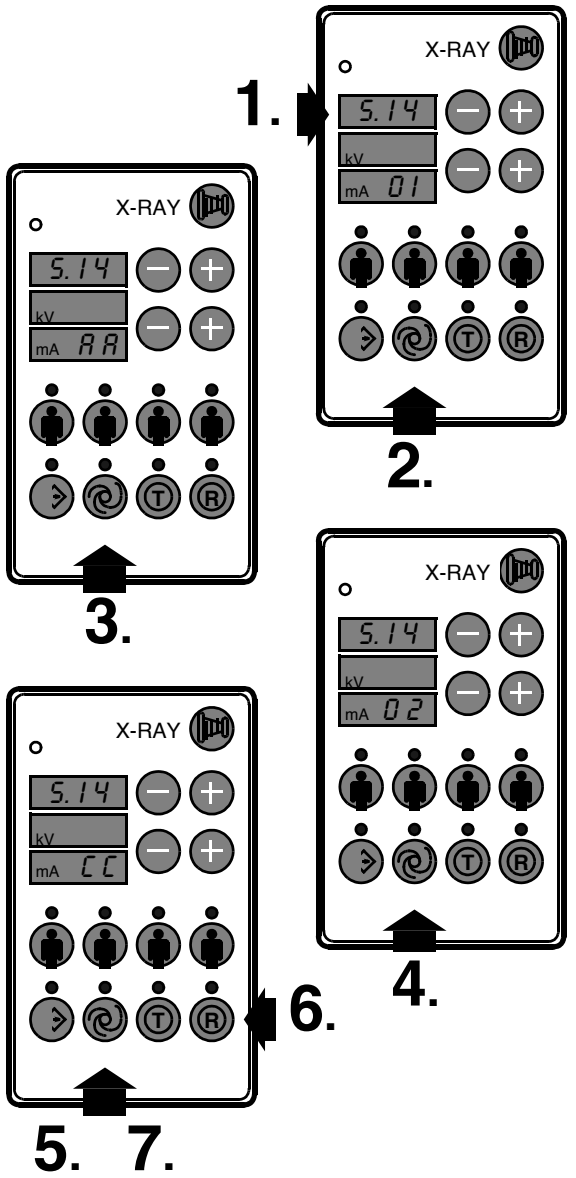
The **movements for Cephalometry** are checked **in test step 02**.

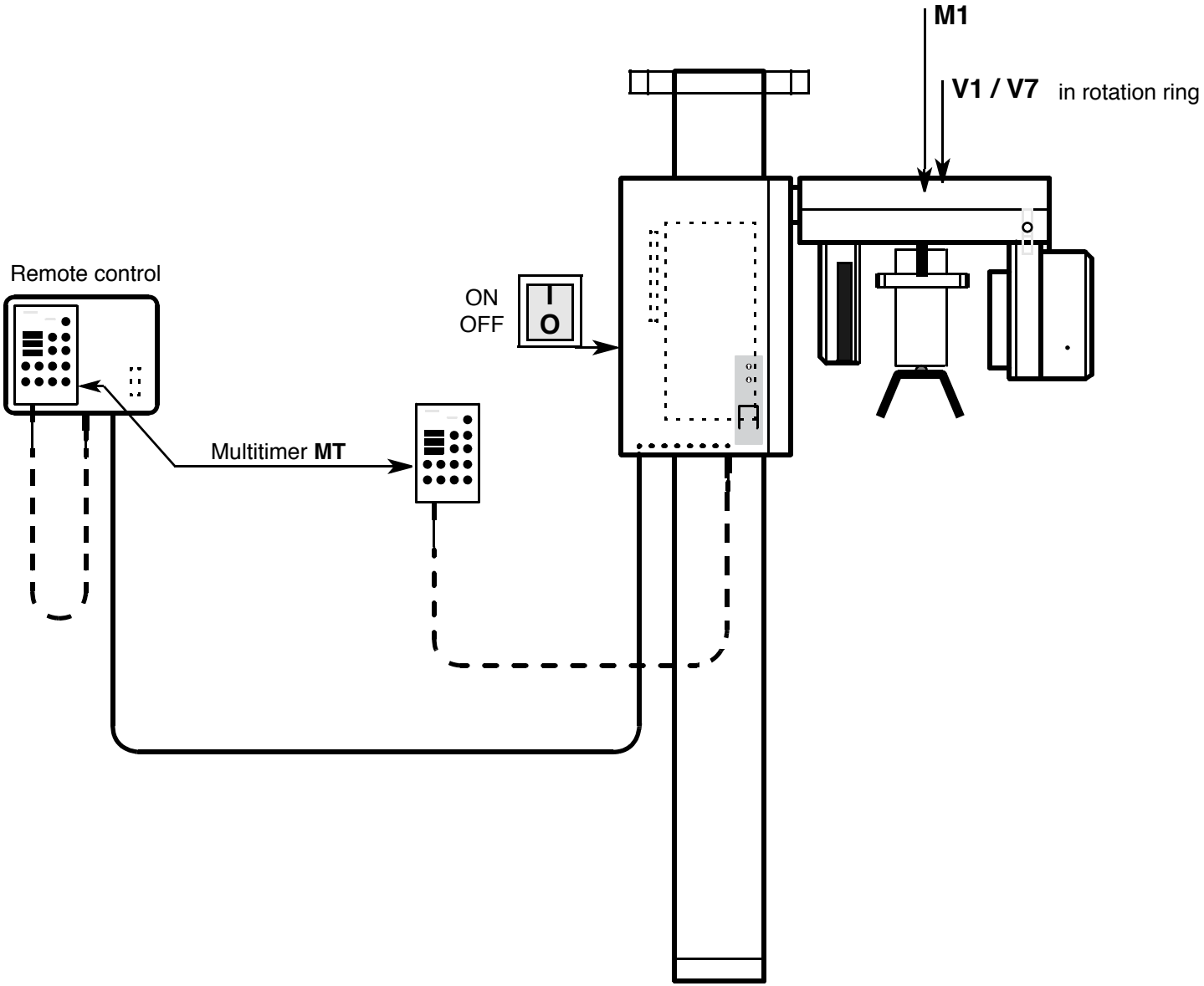
5. Briefly press the service key .
The mA display indicates **00**. The LED above the R key flashes.

6. Press the Return key R.
The X-ray tube assembly travels to the exposure position for Cephalometry and the LED turns off.
CC is indicated on the mA display
The rotation motor M1 keeps the X-ray tube assembly in this position.
If the X-ray tube assembly is moved out of this position, the motor switches off and the LED above the R key flashes.
Error message **E3 42** appears if the Ceph position is not reached.

7. Briefly press the service key .
The mA display indicates test step **03**.

Continued on next page




M1
V1 / V7 in rotation ring
Remote control
ON
OFF
I
O
Multitimer **MT**

Continued

Free movement of the X-ray tube assembly / rotation ring is possible **in test step 03**.

8. Briefly press the service key .

- If the X-ray tube assembly is not in the start position, the LED above the R key flashes. In this case press Return key R. The X-ray tube assembly now travels to the start position and the LED turns off. The LEDs above the two left-hand symbol keys must light up.

9. Start the rotation with the program + key.
1° angular steps are possible. The steps from **0**° to **225**° are displayed on the program / radiation time display.
To return press the - key.

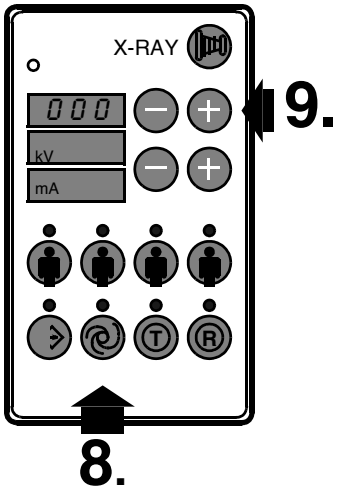
10. Briefly press the service key .
Test step **04** appears on the mA display

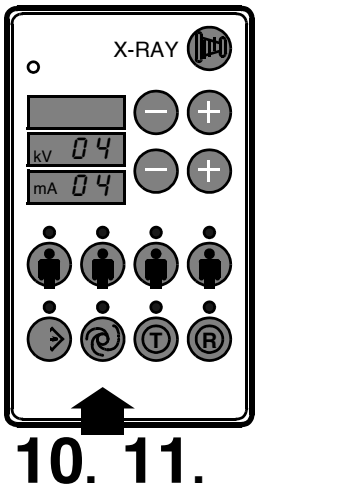
The forked light barriers V1/V7 in the rotation ring are checked **in test step 04**.

11. Briefly test the service key .

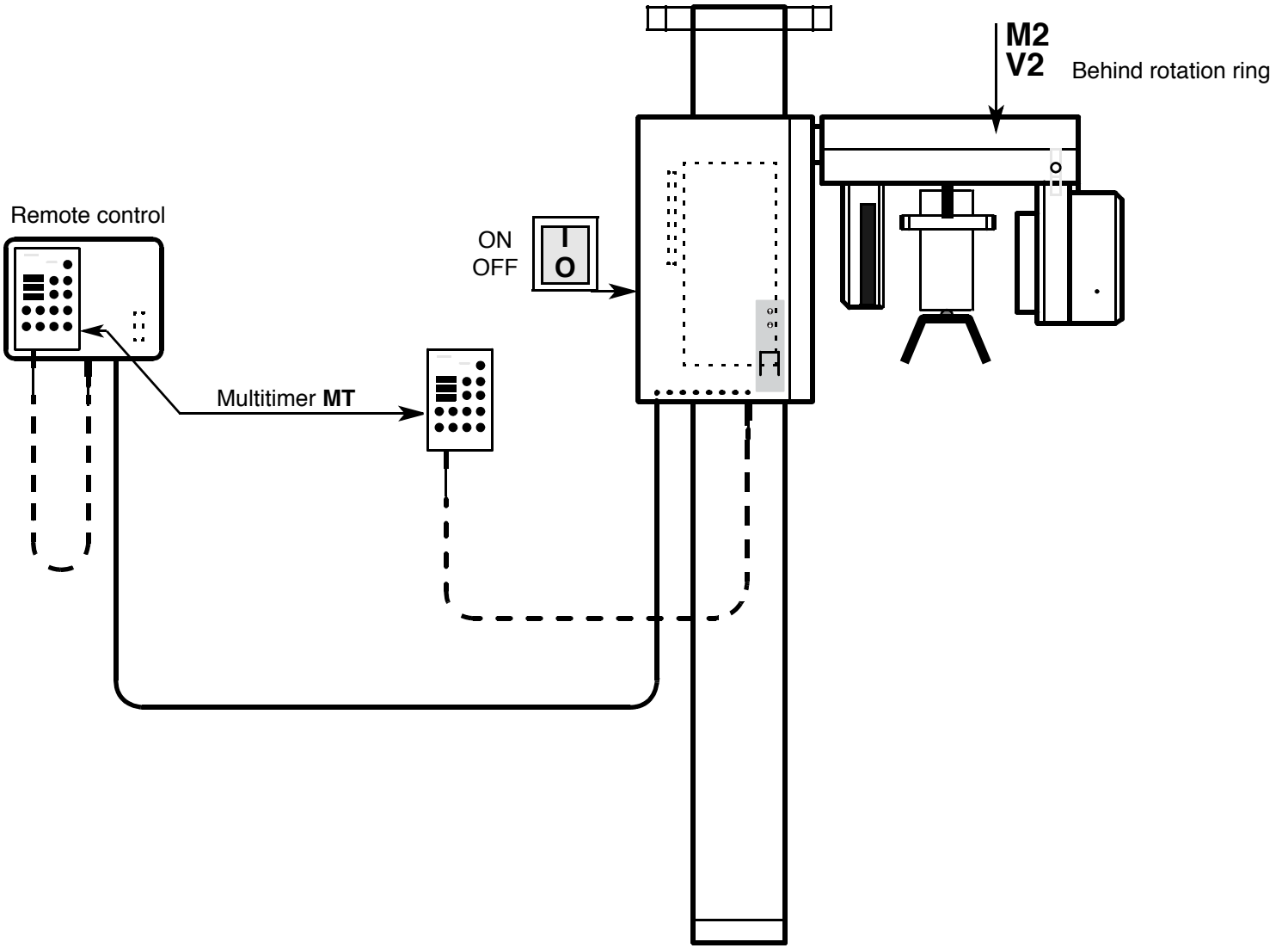
- By hand move the X-ray tube assembly to the start position for Panorama radiography (V1).
- **The LEDs above the two left-hand patient symbol keys must light up.**

- By hand move the X-ray tube assembly to the exposure position for Cephalometry (V7).
- **The LEDs above the two right-hand patient symbol keys must light up.**





5.13 Service routine S.14 Rotation functions


M2
V2
Behind rotation ring
Remote control
ON
OFF
I
O
Multitimer **MT**

- **The actuator M2 is checked with Service routine S.15.**

1. Select Service routine **S.15** as described in section **'Selecting service routines'**.

Test step 01: Panorama mode (no movement of the rotation ring)

2. Briefly press the service key.
   The mA display indicates test step **01**.
3. Briefly press the service key.
   00 appears on the mA display. The LED above the R key flashes.
4. Press the Return key R on the Multitimer.
   The actuator approach the start position (switching edge for light barrier V2 at the actuator).
   The mA display indicates **AA**. The LED above the service key lights up.

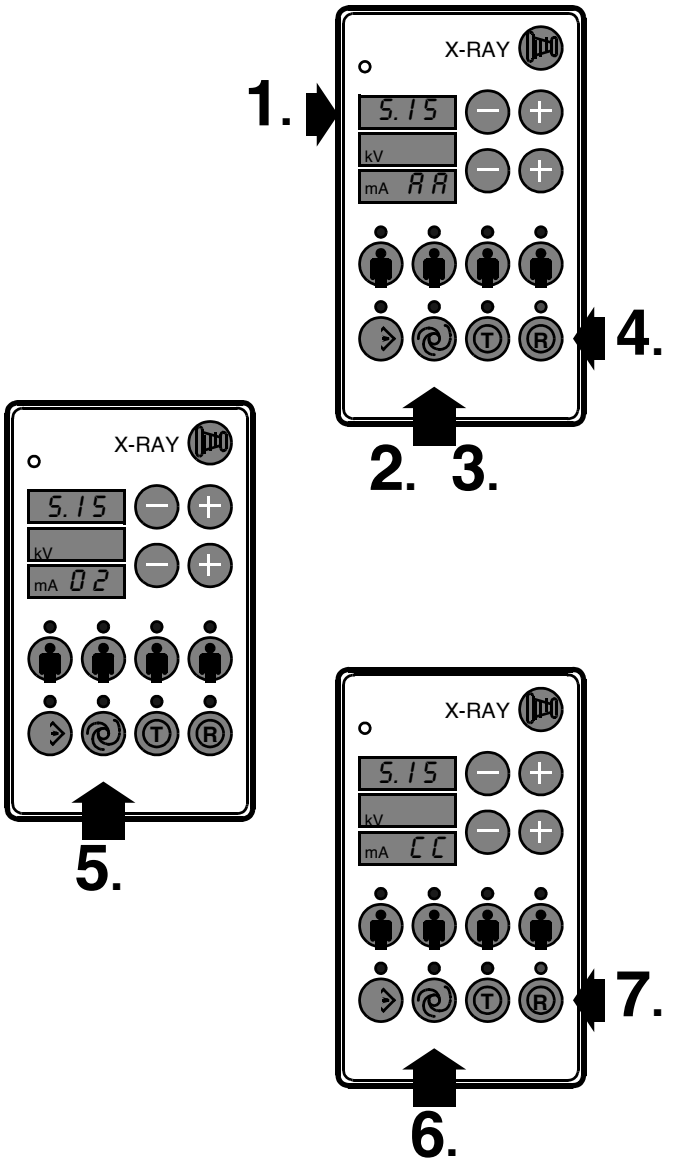
- If the actuator do not travel to the start position, error message **E3 02** is displayed after about 12 seconds. Proceed then according to section '**Correcting error of message E3 02 ',**
  see page 3 - 47.

Test step 02: Cephalometry mode (no movement of the rotation ring)

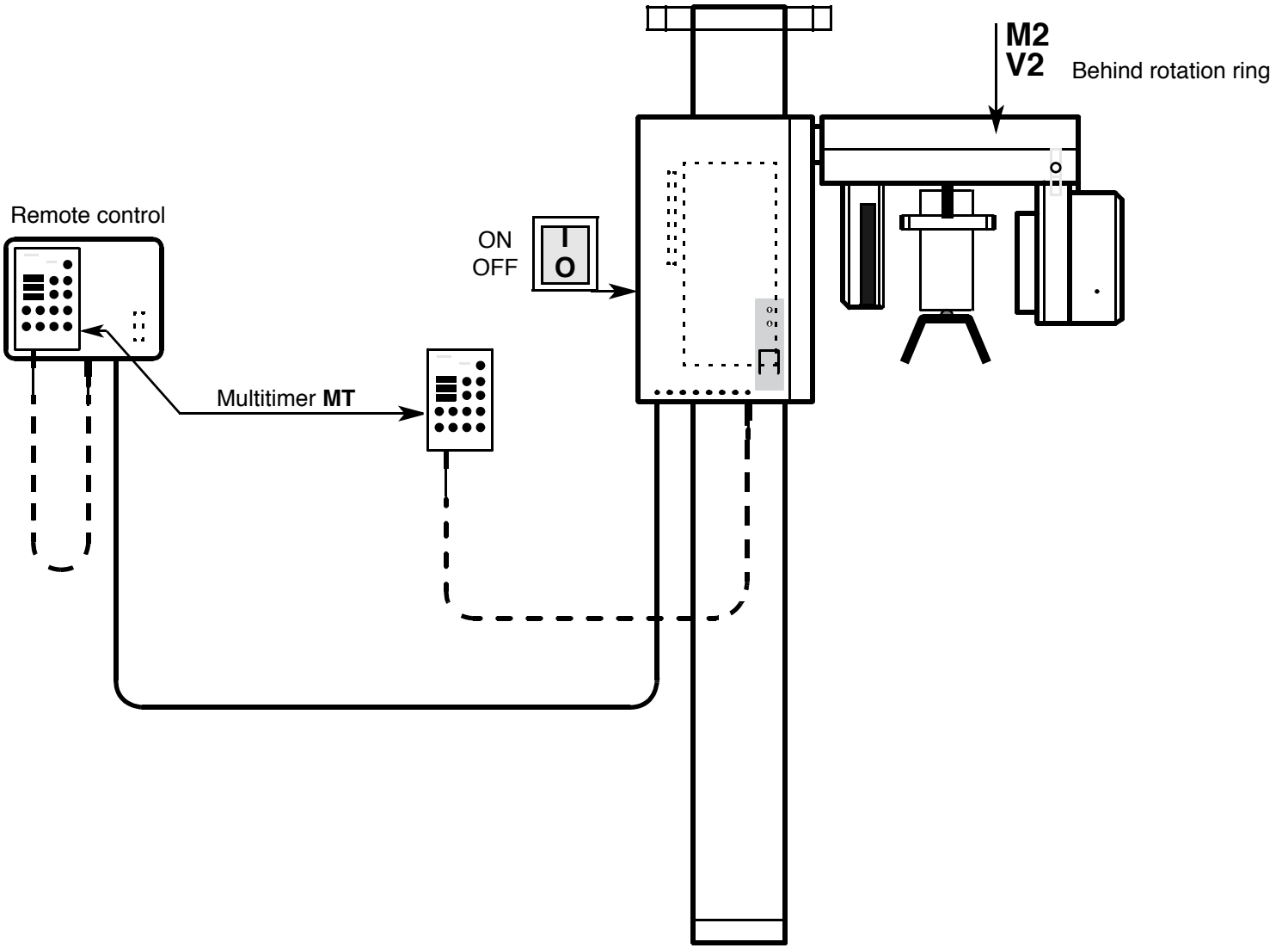
5. Briefly press the service key.
   The mA display indicates **02**.
6. Briefly press the service key.
   00 is indicated on the mA display. The LED above the R key flashes.
7. Press the Return key R on the multitimer.
   The actuator approach the **cephalometry position** (switching edge for light barrier V2). The mA display indicates **CC**. The LED above the service key lights up.

- If the actuators do not approach this position, error message **E3 02** is displayed after about 12 seconds.
  Proceed then according to section **'Correcting error of message E3 02 ',**
  see page 3 - 47.

Continued on next page



5.14 Service routine S.15 Checking the actuator M2


M2
V2
Behind rotation ring
Remote control
ON
OFF
I
O
Multitimer **MT**

Continued

Test step 03: Free movement of actuator M2 (no movement of the rotation ring)

8. Briefly press the service key .
The mA display indicated **03**.

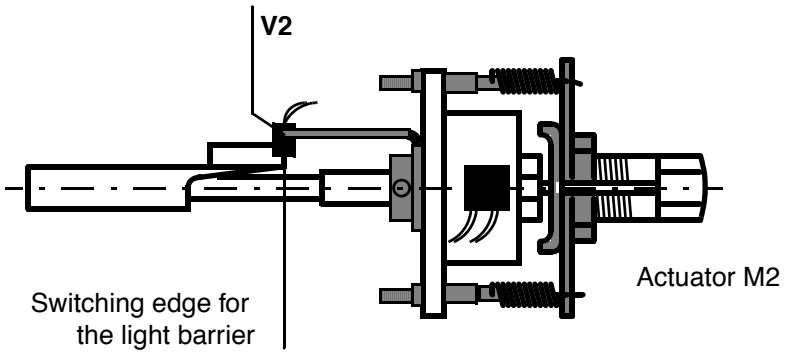
9. Briefly press the service key .
00 is indicated on the mA display, the LED above the R key flashes.

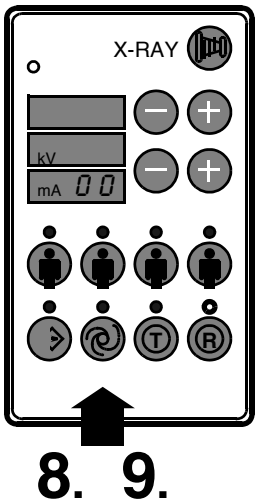
10. Press the Return key **R** on the multitimer. The actuator moves to the **trigger position**.
(Trigger position = switching edge of light barrier V2).
The LED turns off. The mA display indicates **20**.

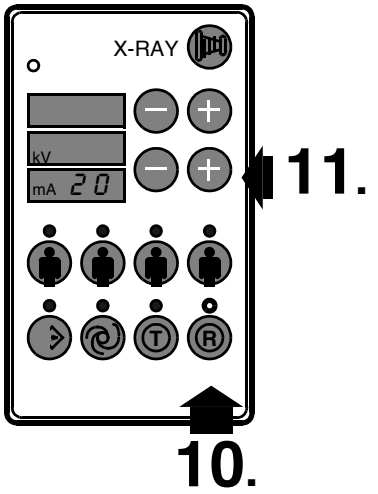
11. The actuator can be adjusted to a value from 0 - 35 (1 digit = 1 mm) with the kV +/- keys.

- From values **0** to **19** (+1) the 4 LEDs above the patient symbol keys **do not light up**.
- From values **20** to **35** the 4 LEDs above the patient symbol keys **light up**.
- The change "LEDs on/off" takes place at the switching edge for **light barrier V2** at the actuator.

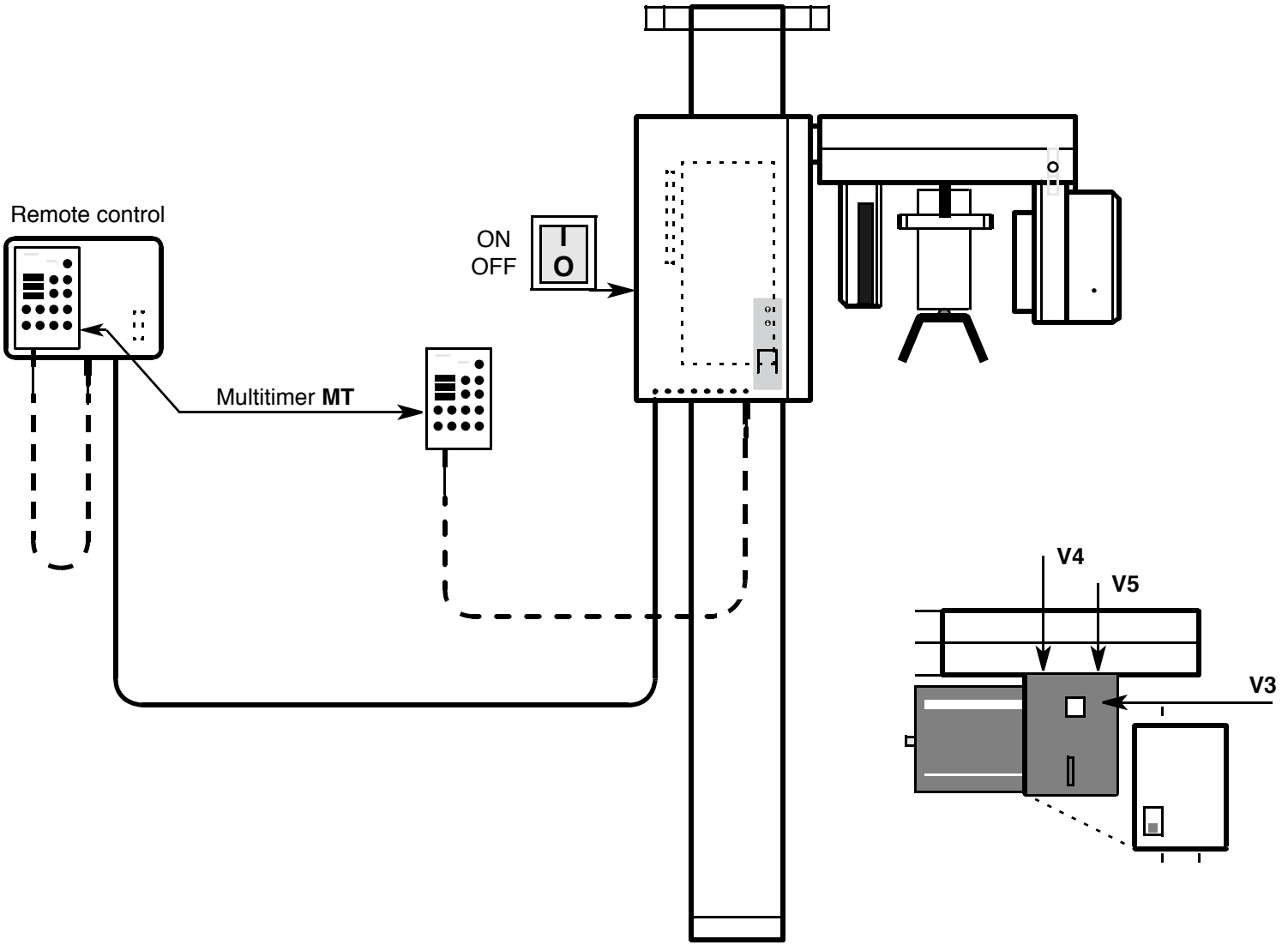
.







5.14 Service routine S.15 Checking the actuator M2


Remote control
ON
OFF
I
O
Multitimer **MT**
V4
V5
V3

ORTHOPHOS 3 / 3 Ceph only

- **The Service routine S.16 is used for checking the film holder.**

1. Select Service routine **S.16** as described in section **'Selecting service routines'**.

Test step 01: Approaching the film reference point

2. Briefly press the service key.
   The mA display indicates test step **01**.
3. Briefly press the service key.
4. Move the cassette holder to the Ceph or Panorama position.
   00 is indicated on the mA display (if film not already in reference position).
   The LED above the R key flashes.
5. Press the Return key **R** on the multitimer.
   The film moves to the reference position.
   AA is indicated on the mA display. The LED above the service key lights up.

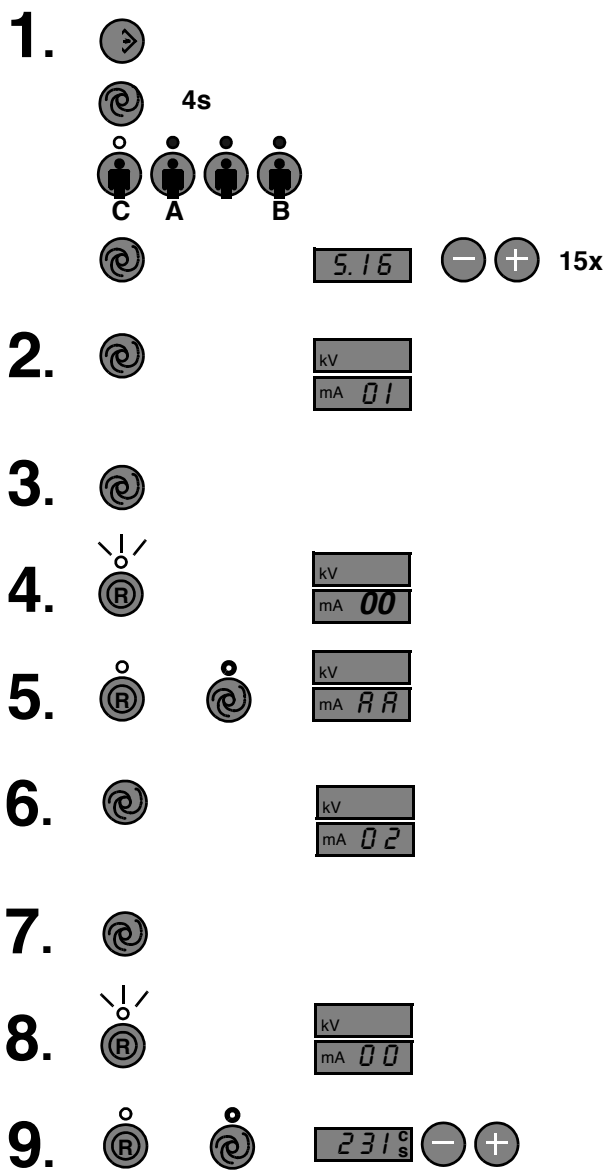
- If the film does not travel to the reference position within a certain time, error message **E3 06** is displayed. Proceed then according to section **'Correcting error of message E3 06'**,
  see page 3 - 49.

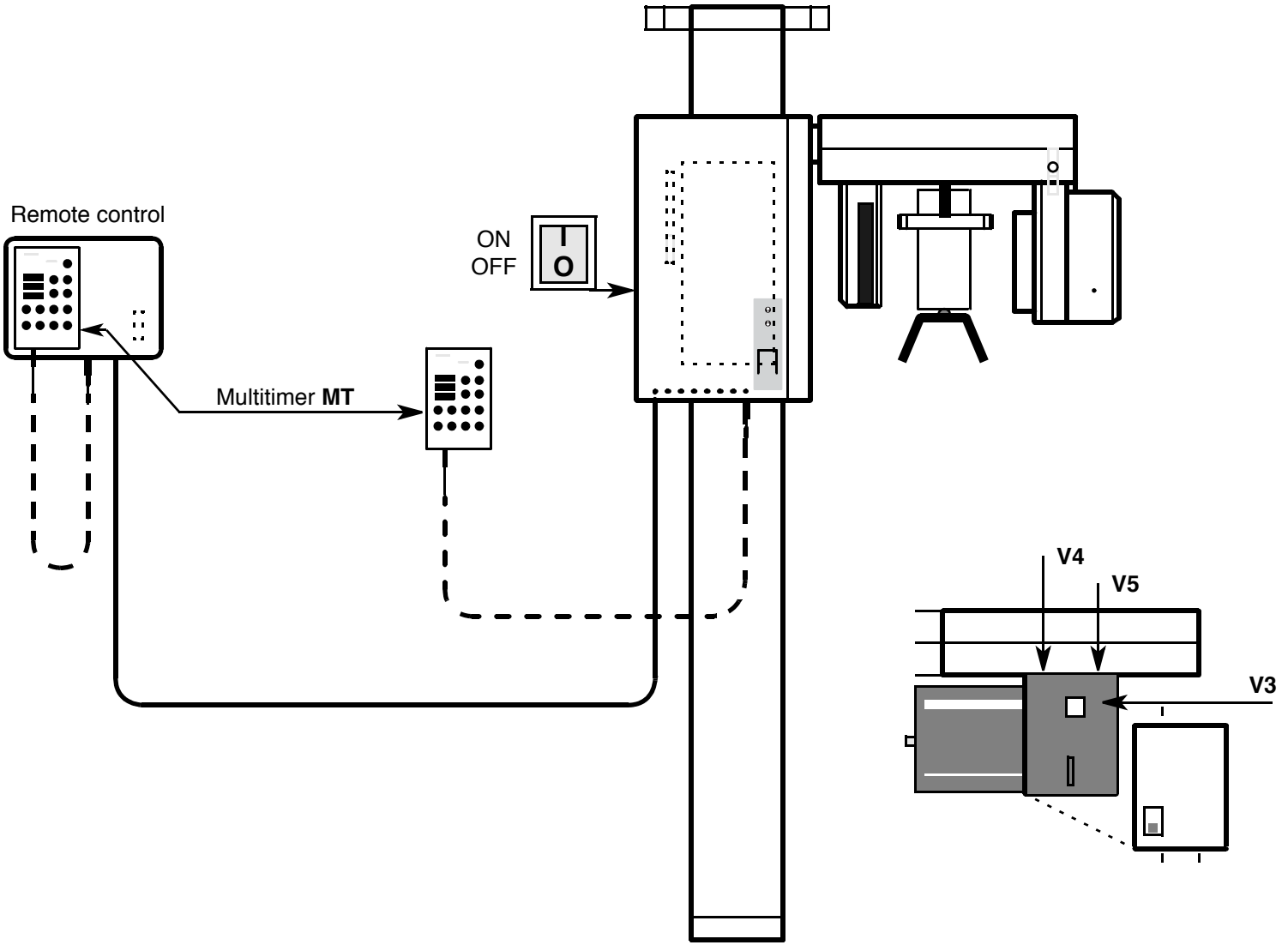
Test step 02: Free movement

6. Briefly press the service key.
   The mA display indicates **02**.
7. Briefly press the service key.
8. Move the cassette holder to the Ceph or panorama position.
   00 is indicated on the mA display (if film not already in reference position).
   The LED above the R key flashes.
9. Press the Return key **R** on the multimeter.
   The film travels to the reference position. **000** is indicated on the program / radiation time display. The 4 LEDs above the patient symbol keys light up.

- The film can be moved in the range from 000 to 231 by the program / radiation time +/- keys.
  Upon leaving the reference position, the 4 LEDs above the patient symbols turn off.

Continued on next page




Remote control
ON
OFF
I
O
Multitimer **MT**
V4
V5
V3

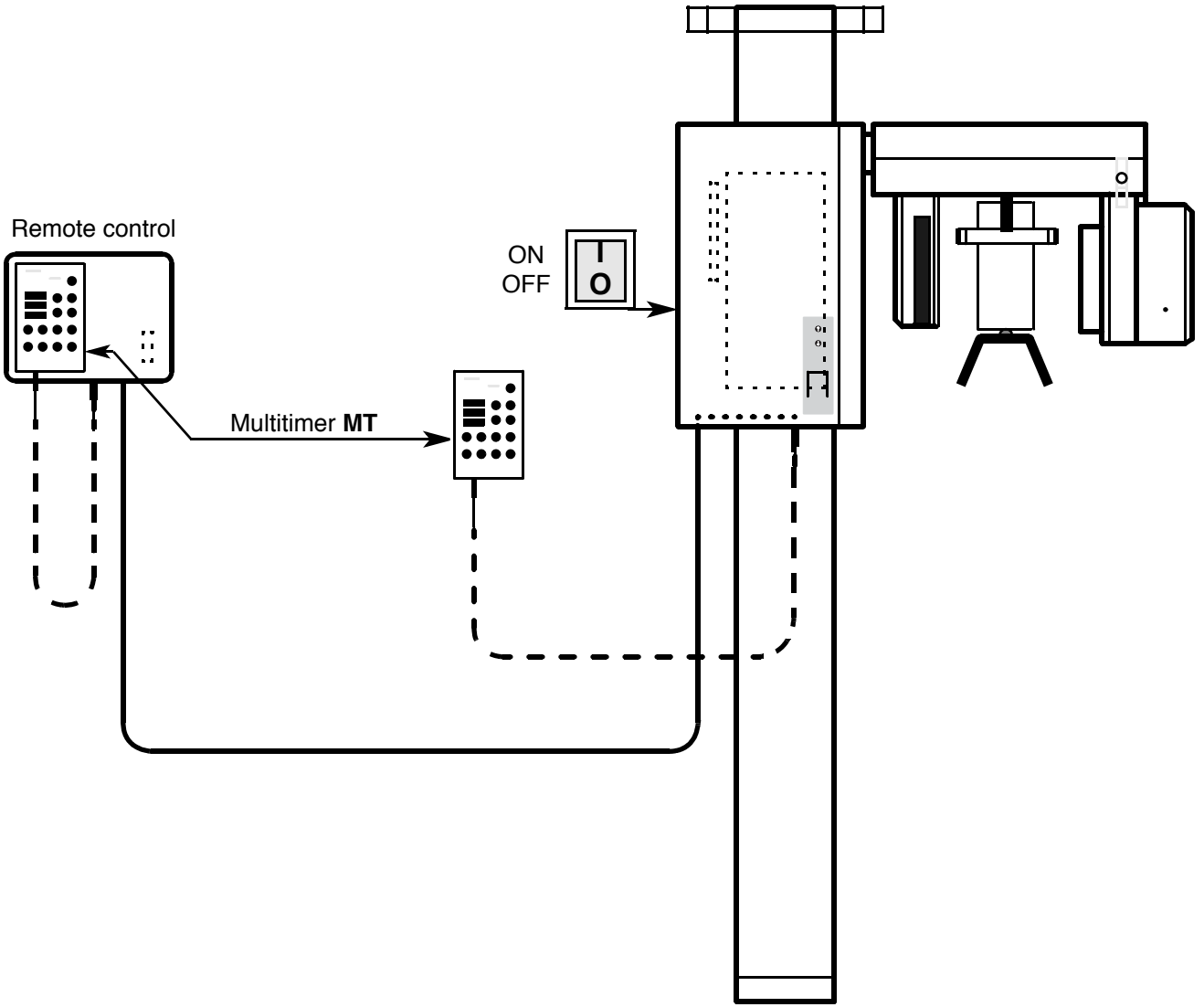
Continued

Test step 03: Light barrier test

10. Briefly press the service key .
The mA display indicates test step **03**.

11. Briefly press the service key .

- The LEDs above the patient symbols show the switching state of the light barriers. All LEDs are turned off if no light barrier is activated.
- LED 1 lights up: Light barrier V3 'reference point of film' is activated.
  The condition for the correct indication of the light barrier signal by LED 1 is:
  Light barrier V4 'Panorama position' must be activated - LED 3 lights up
  or light barrier V5 'Ceph position' must be activated - LED 4 lights up.
- LED 3 lights up: Light barrier V4 'Panorama position' is activated.
- LED 4 lights up: Light barrier V5 'Ceph position' is activated.


Remote control
ON
OFF
I
O
Multitimer **MT**

- **Service routine S.17 is required for the modification of unit versions.**

1. Select Service routine **S.17** as described in section **'Selecting service routines'**.
2. Briefly press the service key.
   The kV display indicates **00**.
3. Enter service code 17.
   The kV display indicates **17**.
4. Briefly press the service key.
   The unit identification stored in the EEPROM of the unit is indicated on the mA display.
   If the unit identification of the memory card should deviate from that on the EEPROM but is compatible with it, then the LED above the memory key flashes.

Taking over the unit identification:

5. Press the memory key (LED stops flashing).
   The LED above the R key flashes.
6. Press the Return key R (LED stops flashing).
   The **new** unit identification now stored in the EEPROM is indicated on the mA display.
7. Briefly press the service key. This exits the Service routine S.17.

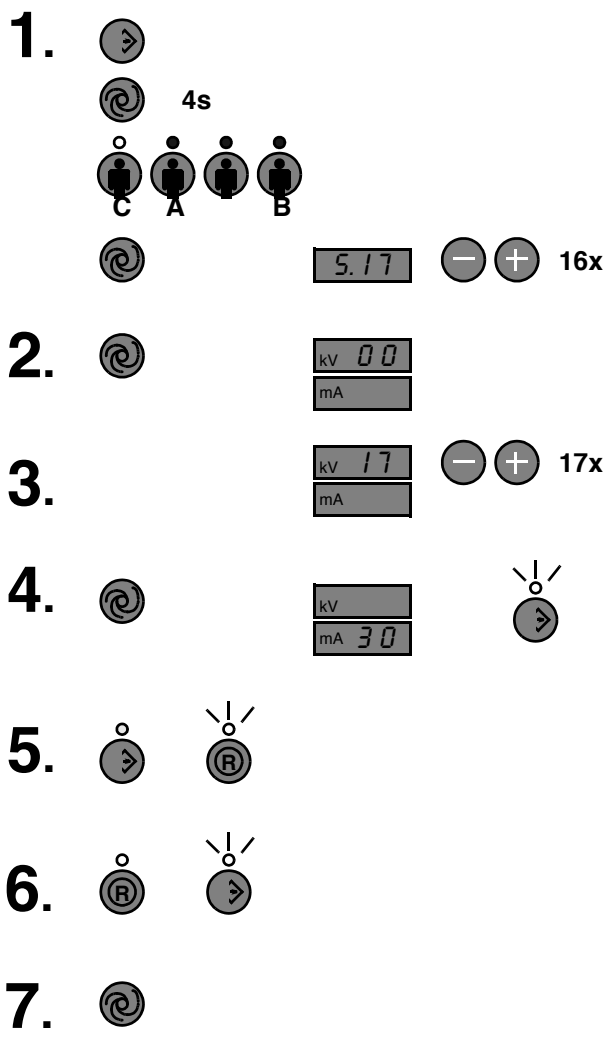
- Transferring the unit identification is not possible, if:
  1. The unit identifications already match (LED above the memory key not flashing).
  2. An incompatibility of the unit identifications (see table) exists (LED above the memory key not flashing).
- To exit Service routine S.17 briefly press the service key.

Unit compatibilities:

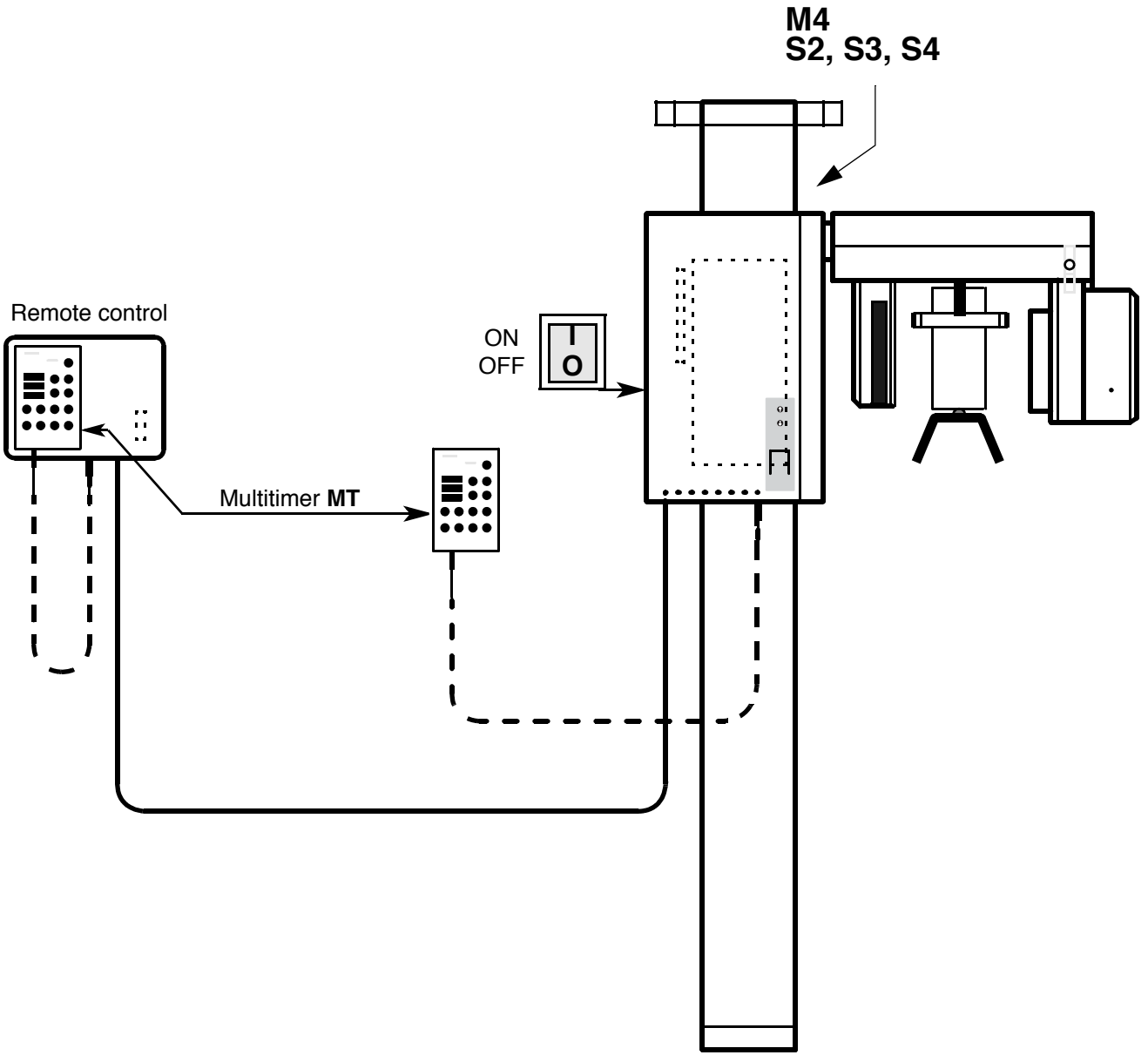
Group A:
10 = ORTHOPHOS DS (Ceph)
12 = ORTHOPHOS Plus DS TSA (Ceph)
50 = ORTHOPHOS Plus / (CD) Filming device
51 = ORTHOPHOS 5 / (CD) Filming device
52 = ORTHOPHOS TS / (CD) Filming device

Group B:
30 = ORTHOPHOS 3 / (C) Filming device
31 = ORTHOPHOS 3 DS

Group identifications may be reprogrammed freely within a group, but not across groups.



5.16 Service routine S.17 Unit identification


M4
S2, S3, S4
Remote control
ON
OFF
I
O
Multitimer **MT**

- **Service routine S.18 is needed for checking the height adjustment.**
- Place the removed panels or substituting weights for the removed panels of approximately 6kg on the rotation ring.

1. Select Service routine **S.18** as described in section **'Selecting service routines'**.

2. Briefly press the service key. The mA display indicates test step **01**.
Select the desired test step with kV +/- keys.

Test step 01: Checking smoothness of movement

3. Briefly press the service key. The kV display indicates 00.

4. With the HV keys move over the entire travel range for the height.
The travel time is indicated in seconds. Display accuracy 0.01s.
A typical travel time is between 40 and 60s.

Briefly press service key. The mA display indicates test step **02**.

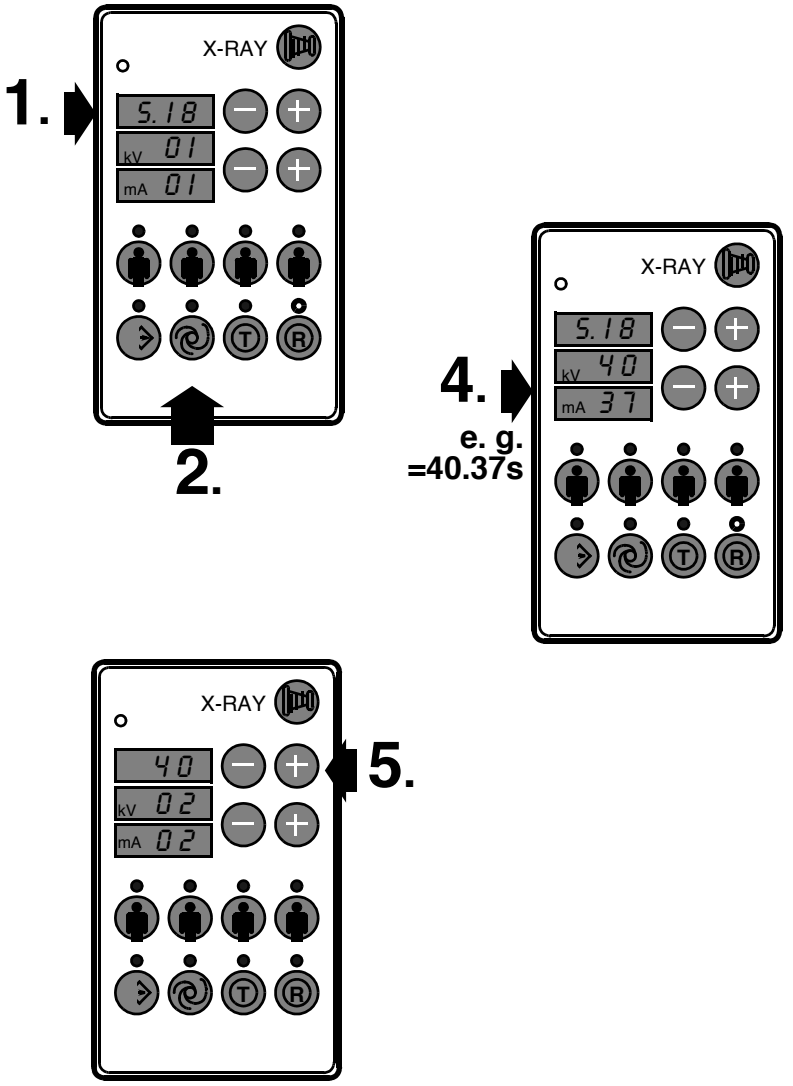
Test step 02: Travel at constant speed.

- Briefly press service key. The kV display indicates test step **02**.
001 is indicated on the Program/Radiation time display of the Multimeter.

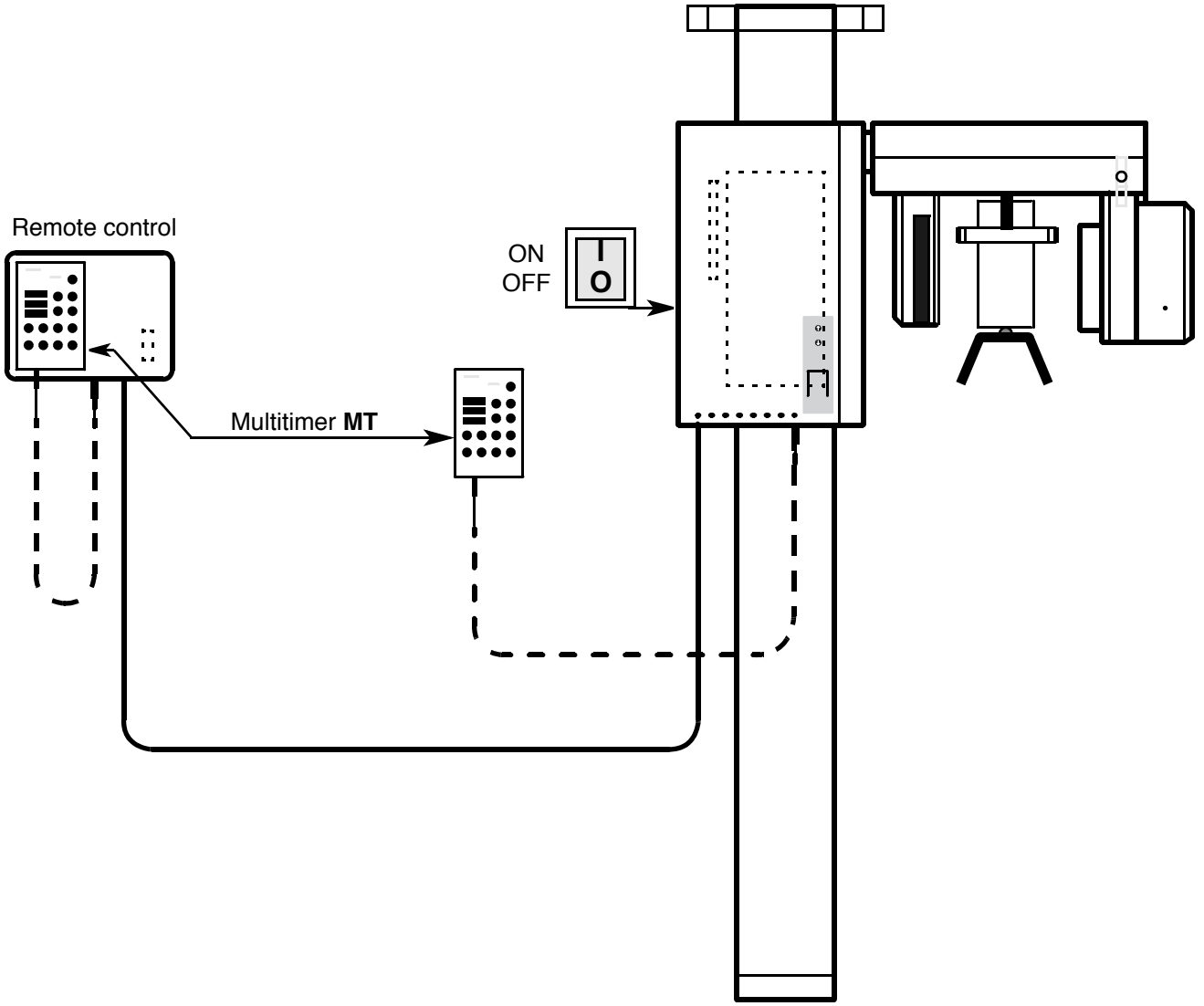
5. With the + / – keys set a PWMvalue betweent 1 and 400. You can expect movement beginning with a value of 30-50.

6. Move the unit from the HV key.

7. Briefly press service key. The mA display indicates test step **01**.



from serial no. 32 000 ORTHOPHOS 3 DS
12 000 ORTHOPHOS 3



- **Service routine S.25 must be performed for adjusting and checking the film/screen combination or the kVmA step series.**

1. Select Service routine **S.25** as described in section **'Selecting service routines'**.
2. Briefly press the service key. The kV display indicates **00**.
3. Enter service code 25. The kV display indicates **25**.
4. Briefly press the service key. The LED above the memory key flashes.

.

For ORTHOPHOS 3/3 Ceph from software version V08.30

Intensifying Screen Kodak Lanex Regular with film Kodak T-Mat G, Agfa Ortholux.

For ORTHOPHOS 3 DS from software version V03.31

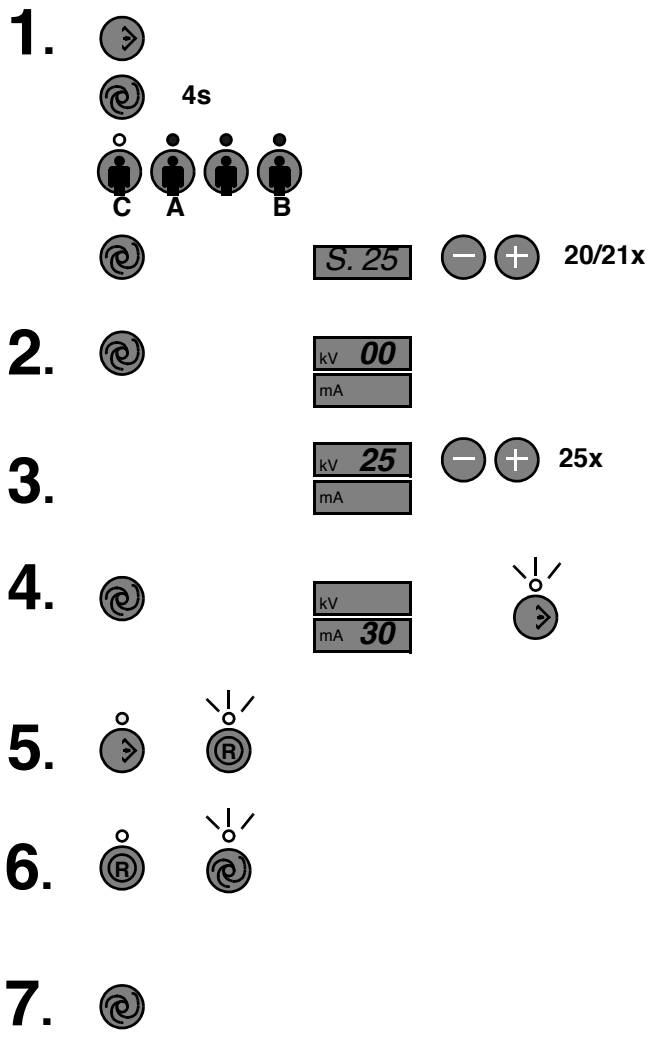
On the mA display, the value **30** or the preprogrammed value must be indicated, if it does not appear, a kVmA step series or a film/screen combination can be adjusted with the kV/mA +/- keys

world-wide (except USA and Asia)	**30**	Step series	**60/10 - 80/10**	Pan
USA	**2A**	You can change between the two step series by actuating one of the two smaller (**60/6 - 76/10)** or one of the two larger (**60/10 - 80/10)** patient symbols.		Pan
Asia	**1A**	You can change between the two step series by actuating one of the two smaller (**60/10 - 80/10)** or one of the two larger (**60/11 - 80/11)** patient symbols.		Pan

(Other characteristic values are not permissible.)

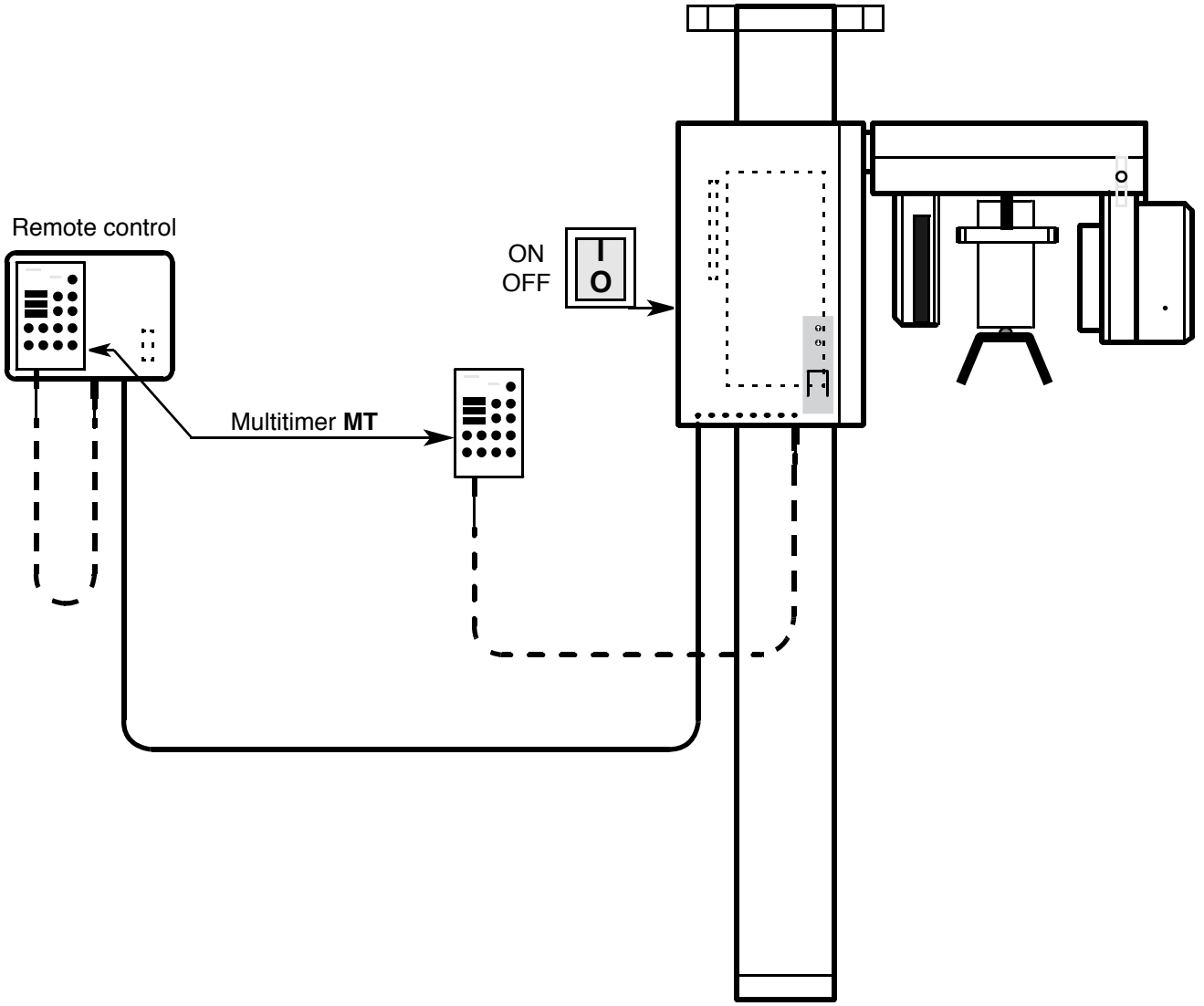
Programming procedure:

5. Press the memory key (LED stops flashing). The LED above the R key flashes.
6. Press the Return key R (LED stops flashing). The LED above the service key flashes.
7. Briefly press the service key. Service routine S.25 is now exited.



5.18 Service routine S.25 Adjusting the film/screen combination or the kVmA step series

from serial no. 32 000 ORTHOPHOS 3 DS
12 000 ORTHOPHOS 3



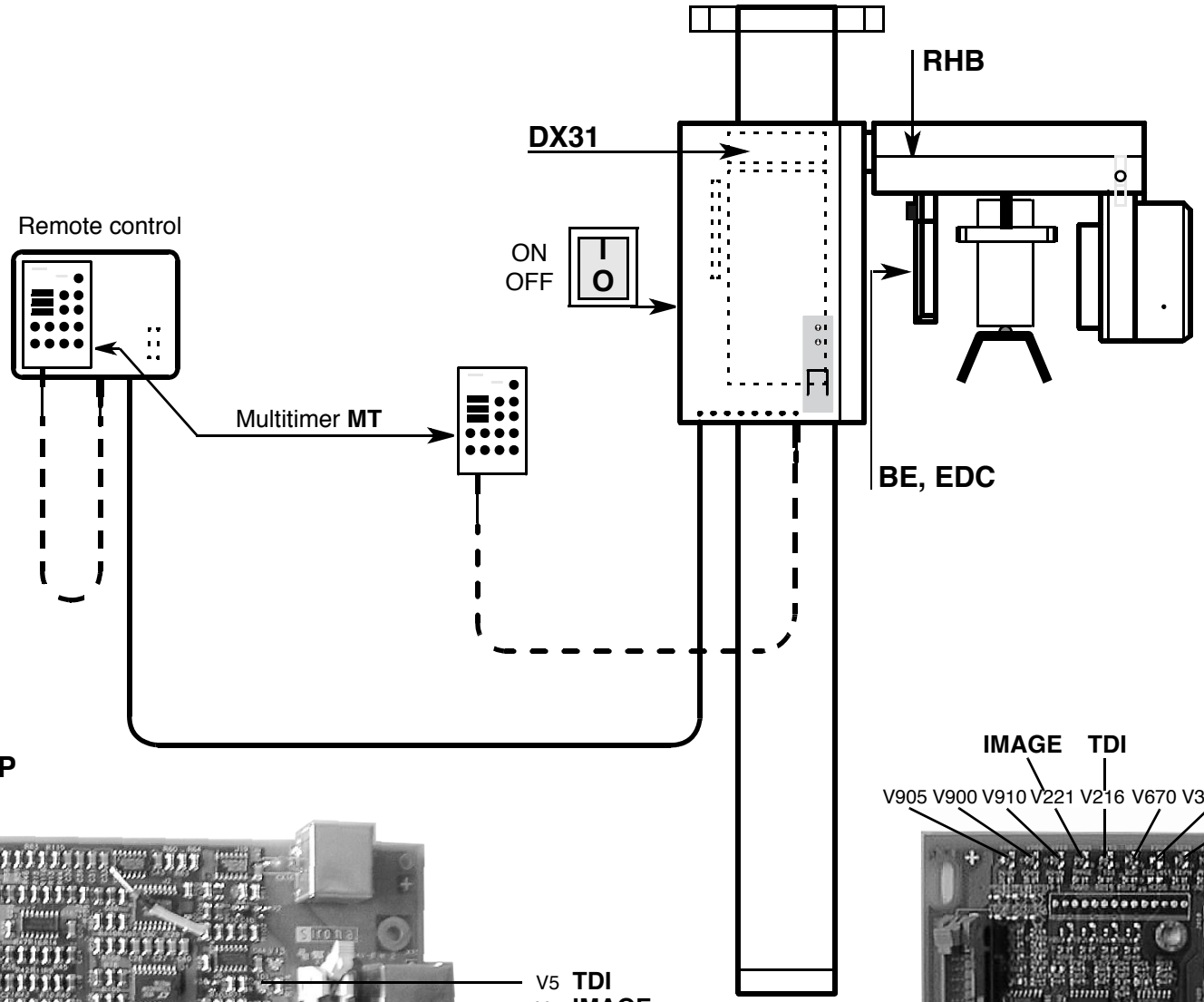
- **Perform the Service routine S.27 for setting and checking the country code.**

1. Select Service routine **S.27** as described in section **'Selecting service routines'**.
2. Briefly press the service key .
   The kV display indicates **00**.
3. Enter service code 27.
   The kV display indicates **27**.
   The mA display indicates test step **01**.
4. Briefly press the service key .
   The program/time display and kV display are switched off.
   The currently set country code is displayed on the mAs display.
5. Set the required country code with the kV/mA ± keys.
   If the country code is changed, the memory LED starts to flash.
   The following country codes are allocated currently:

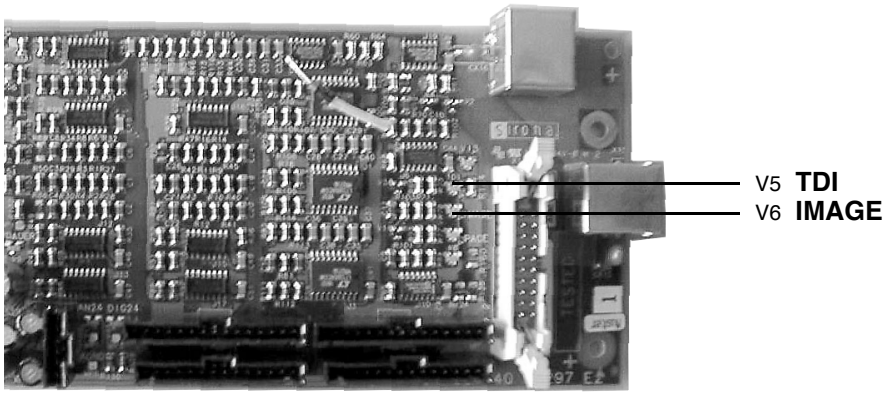
Country code	Meaning
00	World without Asia
01	Asia

Programming procedure:

6. Press the memory key (LED stops flashing).
   The LED above the R key flashes.
7. Press the Return key R (LED stops flashing).
   The LED above the service key flashes.
   The programming process is thus concluded.
8. Briefly press the service key . Service routine S.27 is now exited.


RHB
DX31
Remote control
ON
OFF
I
O
Multitimer **MT**
BE, EDC

XAB OP


V5 **TDI**
V6 **IMAGE**

DEB

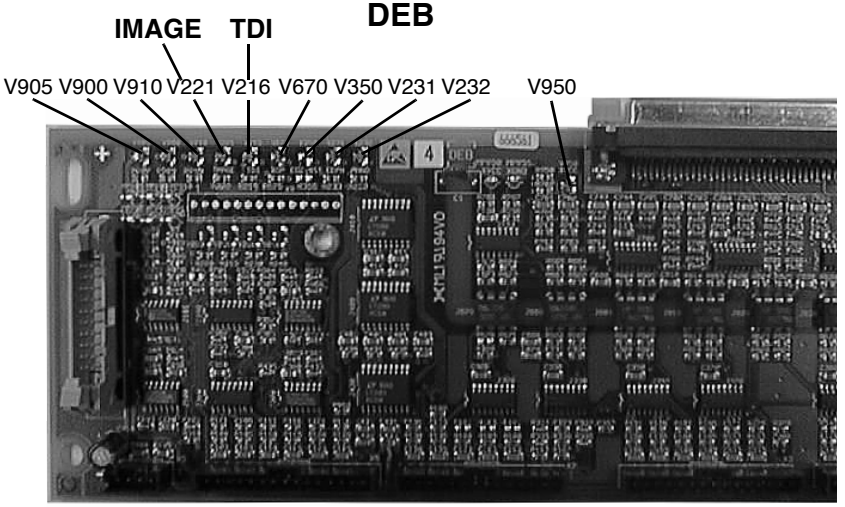


IMAGE
TDI
V905 V900 V910 V221 V216 V670 V350 V231 V232
V950

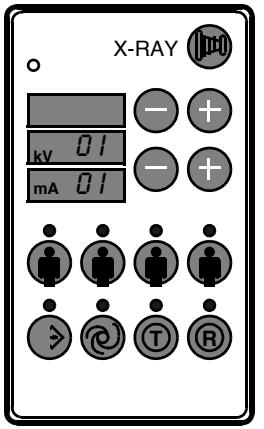
For ORTHOPHOS DS Service routine S.32,.

- **Service routine S.32 is required for checking the image receptor.**

1. Select Service routine **S.32** as described in section **'Selecting service routines'**.
2. Briefly press the service key. The mA display indicates test step **01**.
   Select the desired test step with the kV +/- keys.

Test step 01: Checking the voltage supply for the image receptor
The supply voltages can be measured on board RHB.

Test step 01		
kV display	00	VCC missing
	01	VCC OK
mA display	00	reset
	01	no reset



3. Briefly press the service key. **dd dd** is indicated on the kV/mA display.
4. Press the X-ray button. For 240 seconds the image receptor is ready for exposure.
   The operating time of 240 sec on the program/radiation time display counts backwards.
   The LED above the R key flashes.

- The readiness for exposure may be turned off earlier by pressing the R key.
- The cool-down interval is 1/2 the exposure time and can be retrieved by pressing the X-ray key.

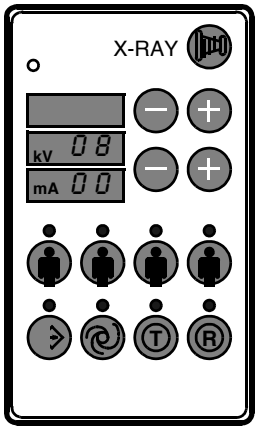
Test step 02: Clock pulses for image information

5. Briefly press the service key.
   The TDI pulse frequency is indicated in Hertz (0800 = 800 Hz) on the kV/mA display.

- The frequency can be adjusted in the range from 1000 Hz to 100 Hz with the kV +/- keys.

6. Press the X-ray button. For 240 seconds the image receptor is ready for exposure.
   The operating time of 240 sec on the program/radiation time display counts down.
   The LED above the R key flashes.

- The image receptor provides pulses for permanent image information (signals IMAGE and TDI are generated). Check the LEDs on board DEB or XAB OP.
- The readiness for exposure may be turned off earlier by pressing the R key.
- The cool-down interval is 1/2 the exposure time and can be called up by pressing the X-ray key.

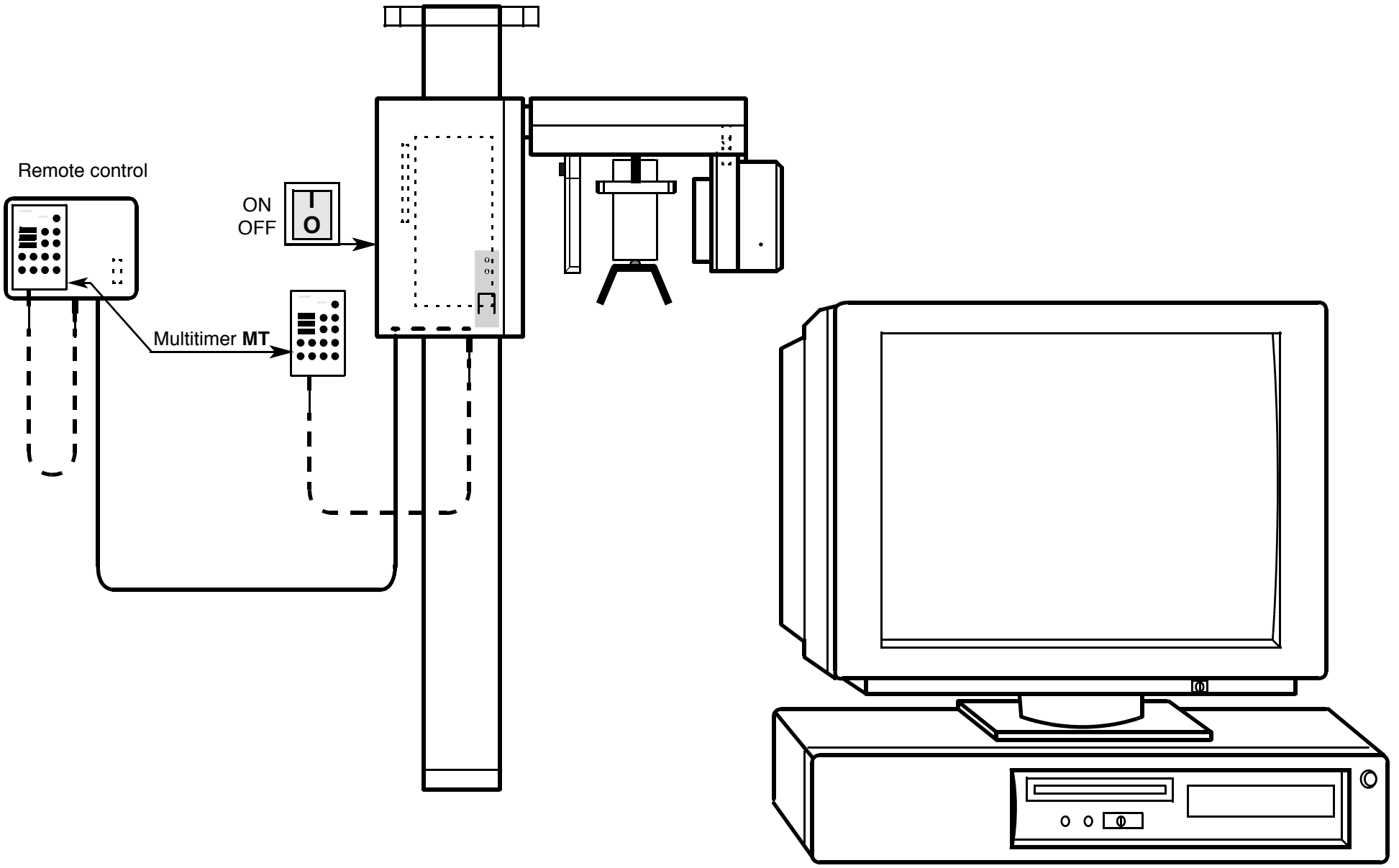


Test step 03: Detection of plug-in slot

7. Briefly press the service key.
   The kV display indicates whether or not the image receptor has been detected.

- kV display: 00 means image receptor not plugged in,
  01 means image receptor plugged in.

5.20 Service routine S.32 Image receptor service: Panorama


Remote control
ON
OFF
Multitimer **MT**

ORTHOPHOS DS only

- **Service routine S.35 is required for checking the readiness for exposure.**
- Set the readiness for exposure as described in section **'Setting exposure readiness on the PC'**. Select **Factory service (2)**.

1. Select Service routine **S.35** as described in section **'Selecting service routines'**.

2. Briefly press the service key.
Briefly press the service key. The kV display indicates 01.

Test step 01: PC Service

- The image receptor hardware Active signal is output to the kV display

	XOP/DEB	XAB OP
00	PC voltage supply DEB_XPWR is not present. LED V950 (DEB) VCC = OFF	XAB OP not in operation LED V10 (XAB OP) VCC = OFF
01	PC voltage supply DEB_XPWR is present. LED V950 (DEB) VCC = ON	XAB OP in operation LED V10 (XAB OP) VCC = ON

- The signal ACTIVE is indicated on the mA display.

  00: ACTIVE is not present

  01: ACTIVE is present

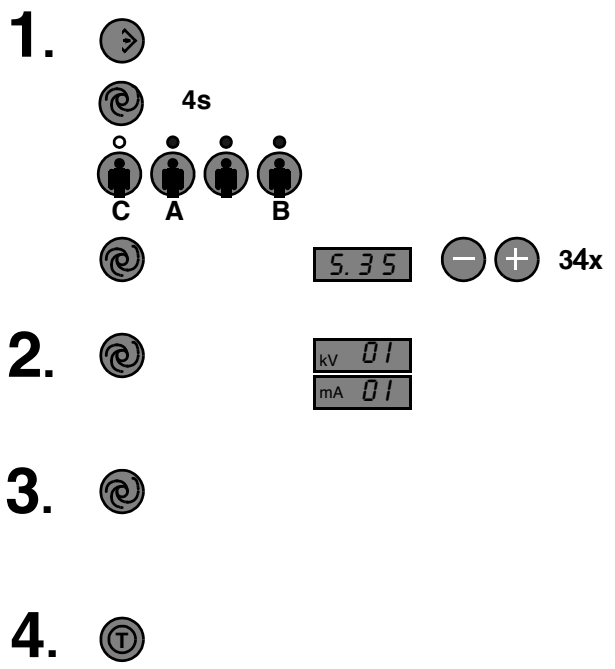
3. Briefly press the service key. Test step 02 is displayed.

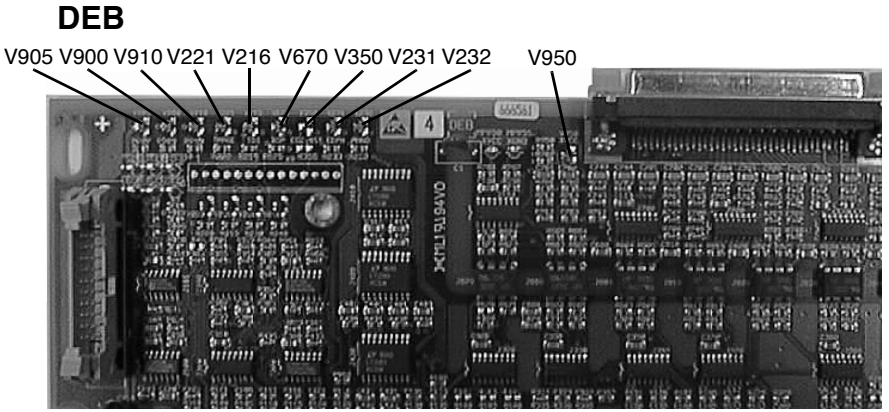
Test step 02: Setting the Active signal

In the mA indication of the Multitimer 00 is displayed

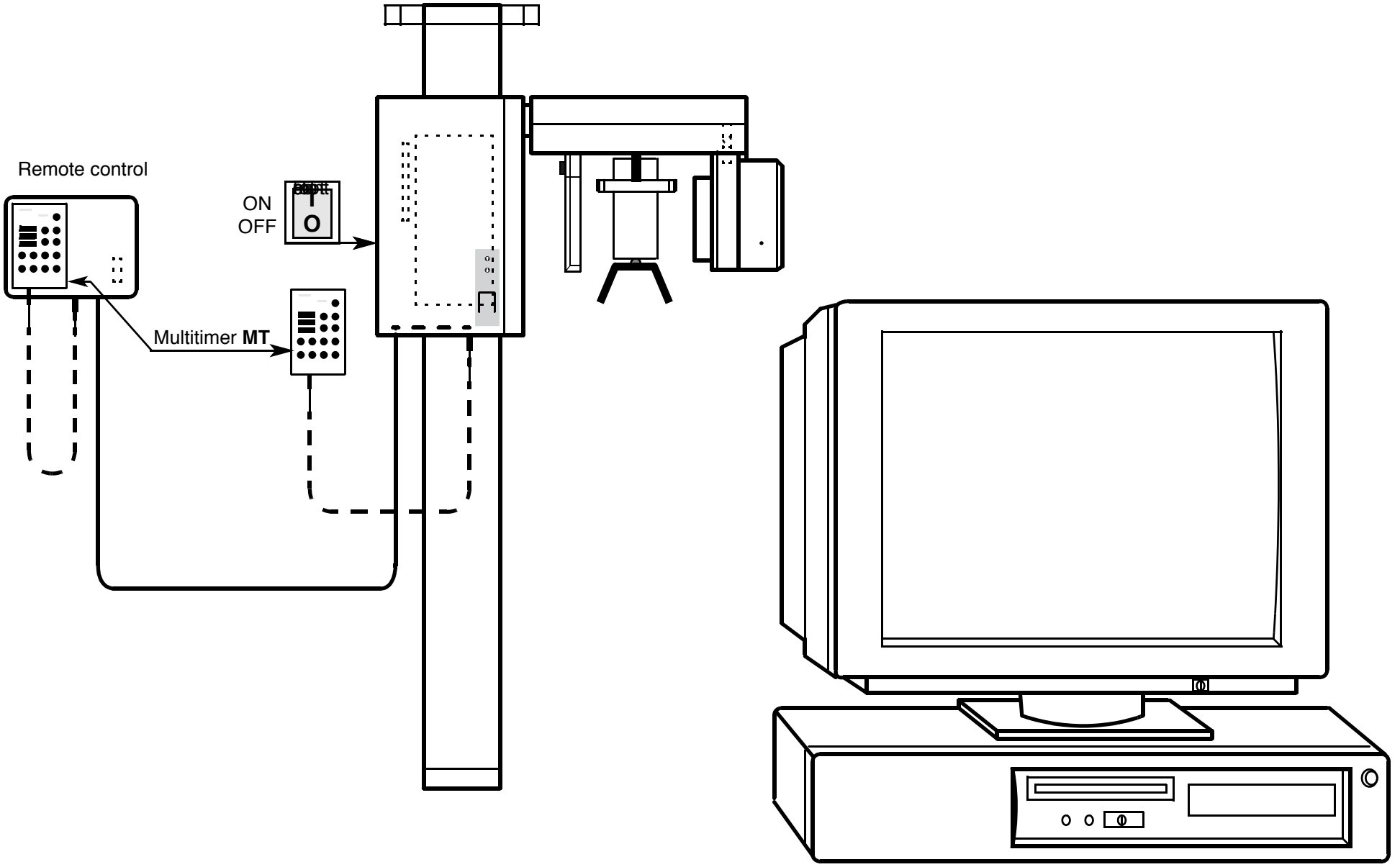
4. Actuate the test sequence button on the Multitimer to set the Active signal.
The ma indication changes to **11**.

Now Service routines S.01, S.02, S.03, S.04, S.05 can be run without first selecting “Constancy check/Factory service” on the SIDEXIS PC (use ± keys to select)
You can also reset the active signal in the same way with this test step (switch mA indication back to 00 with test sequence button). However, the active signal is automatically reset when factory service is selected on the SIDEXIS PC or the unit is switched off.





from serial no. 31 000 ORTHOPHOS 3 DS



For ORTHOPHOS 3 DS only:

- **Service routine S.37 is required to call up and delete the IP address settings.**

1. Select service routine **S.37** as described in the chapter **'Selecting a service routine'**.
2. Press the service key briefly.
   The kV display reads **00**.
3. Enter service code **37** with the + key.
   The kV display then reads **37.**
4. Press the service key briefly.
   Test step 01 appears on the mA display.
   Select the required test step with the kV +/- keys.

   Test step 01: Address displays
5. Press the service key briefly.
   On the program/radiation time display the first 3-digit block of the IP address appears and the 1-LED patient symbol lights up.
   The kV display reads 01.

   The addresses can be read out as follows:
   Select the address with kV +/- keys and the kV display.

   01 = IP address

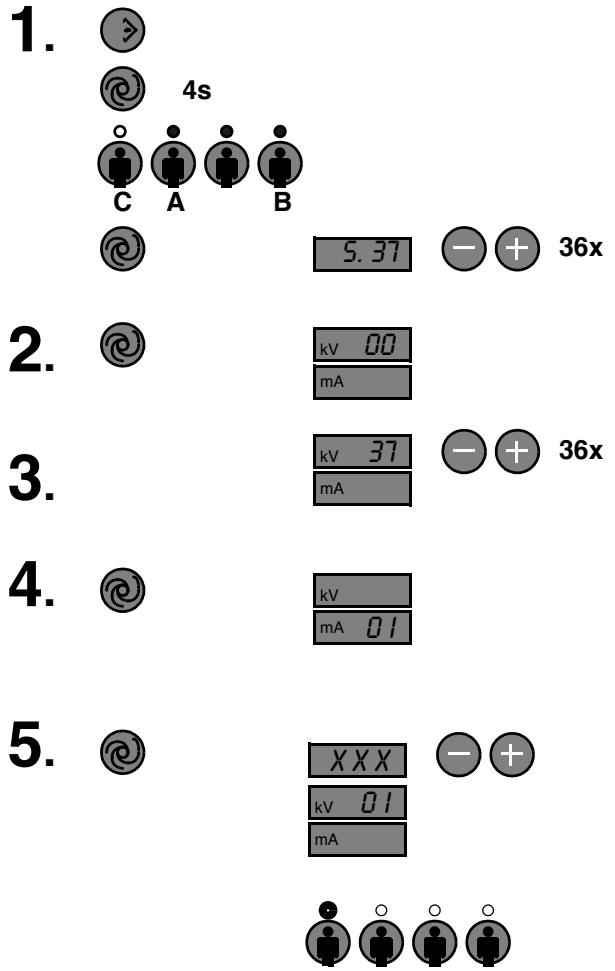
   02 = Standard gateaway

   03 = Subnet mask

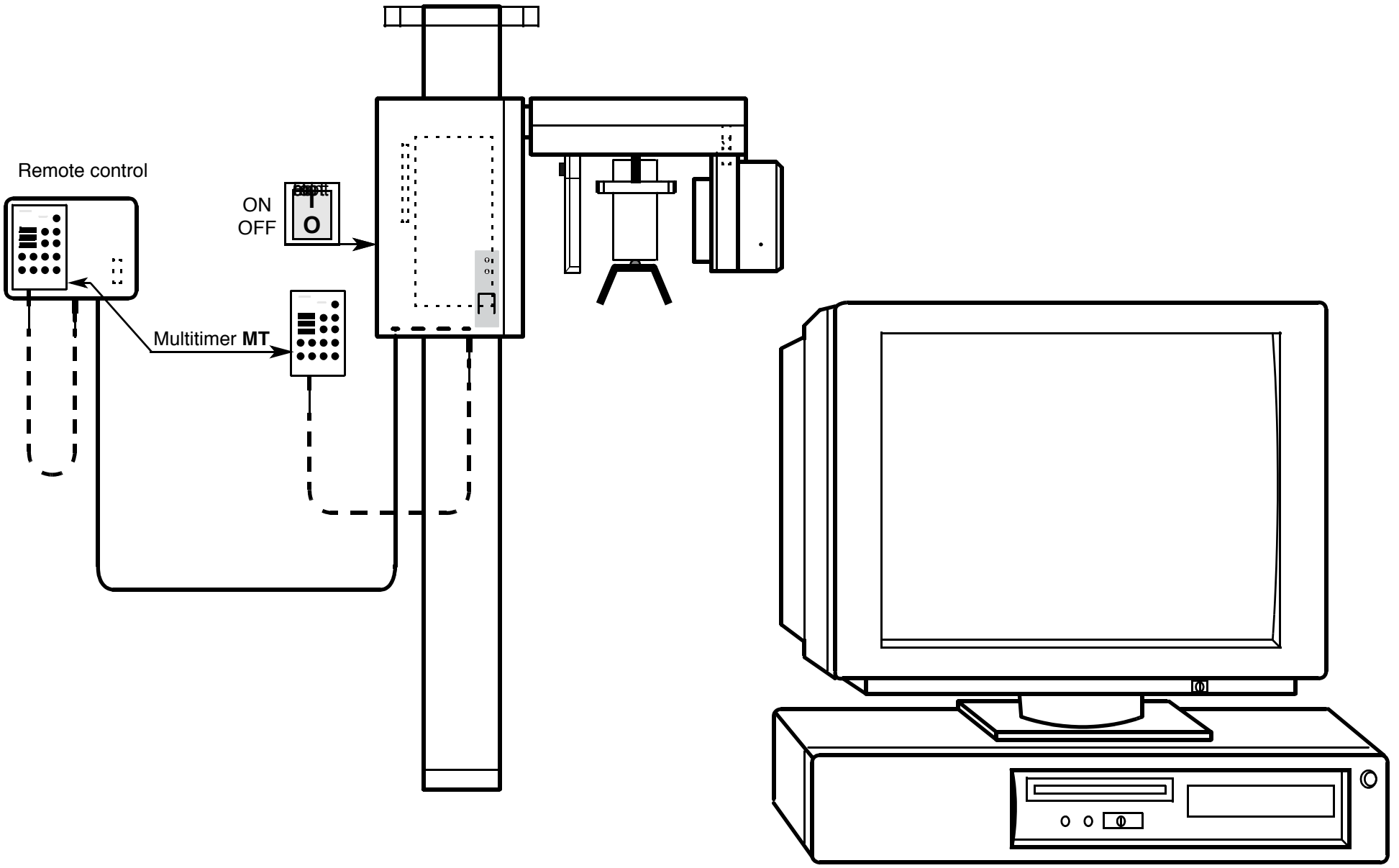
   Use the patient symbol keys to switch to the next address block.
   Syntax “xxx . xxx . xxx . xxx” (Led 1, Led 2, Led 3, Led 4).

   Note: If the system concerned is an XOP system or the XAB system is not recognized, the kV/mA display will be set to "EE/EE" after the test step is selected with the service key.
   If no communication takes place, error message E4 10 will be displayed.

Continued on next page



from serial no. 31 000 ORTHOPHOS 3 DS



Test step 02: Deleting the IP addresses

This test step is required to reset the X-ray component to the factory setting

6. Press the service key briefly.
The kV/mA display reads **FF FF**.
The LED above the Memory key flashes.

7. Press the Memory key.
The LED above the R key flashes.

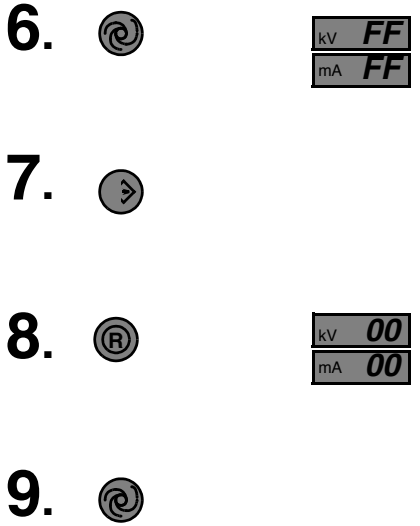
8. Press the R return key.
The addresses of the XAB system are deleted.
The kV/mA display reads **00 00**.

9. Press the service key briefly.

10. Switch the unit off, wait for at least 60s and then switch it back on.

- If the "**Configuration of X-ray Components**" (SIXABCON) program and the "**New Component**" field are selected on the PC, error message E4 21 (the XAB system is in "Boot Service") will appear following the self-adjustment procedure. The unit is ready to receive new addresses.
- If the "**New Component**" dialog is **not** selected on the PC, the XAB system will automatically set its internal default addresses after 10s have elapsed at the latest, and can be detected under these addresses until the next time it is switched off.

  Note: If the system concerned is an XOP system or the XAB system is not recognized, the kV/mA display will be set to "EE/EE" after the test step is selected with the service key.
  If no communication takes place, error message E4 10 will be displayed.



Default address setting of networked Orthophos		
01	IP address	192.168.15.200
02	Standard gateway	192.168.15.1
03	Subnet mask	255.255.255.0

sirona
The Dental Company

6 Repairs

Repairs

Contents

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6.2 Replacing the actuator M2 ..... 6 - 9
6.3 Replacing the spindle with motor M4 for height adjustment ..... 6 - 11
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6.7 Replacing Column Stand ..... 6 - 23
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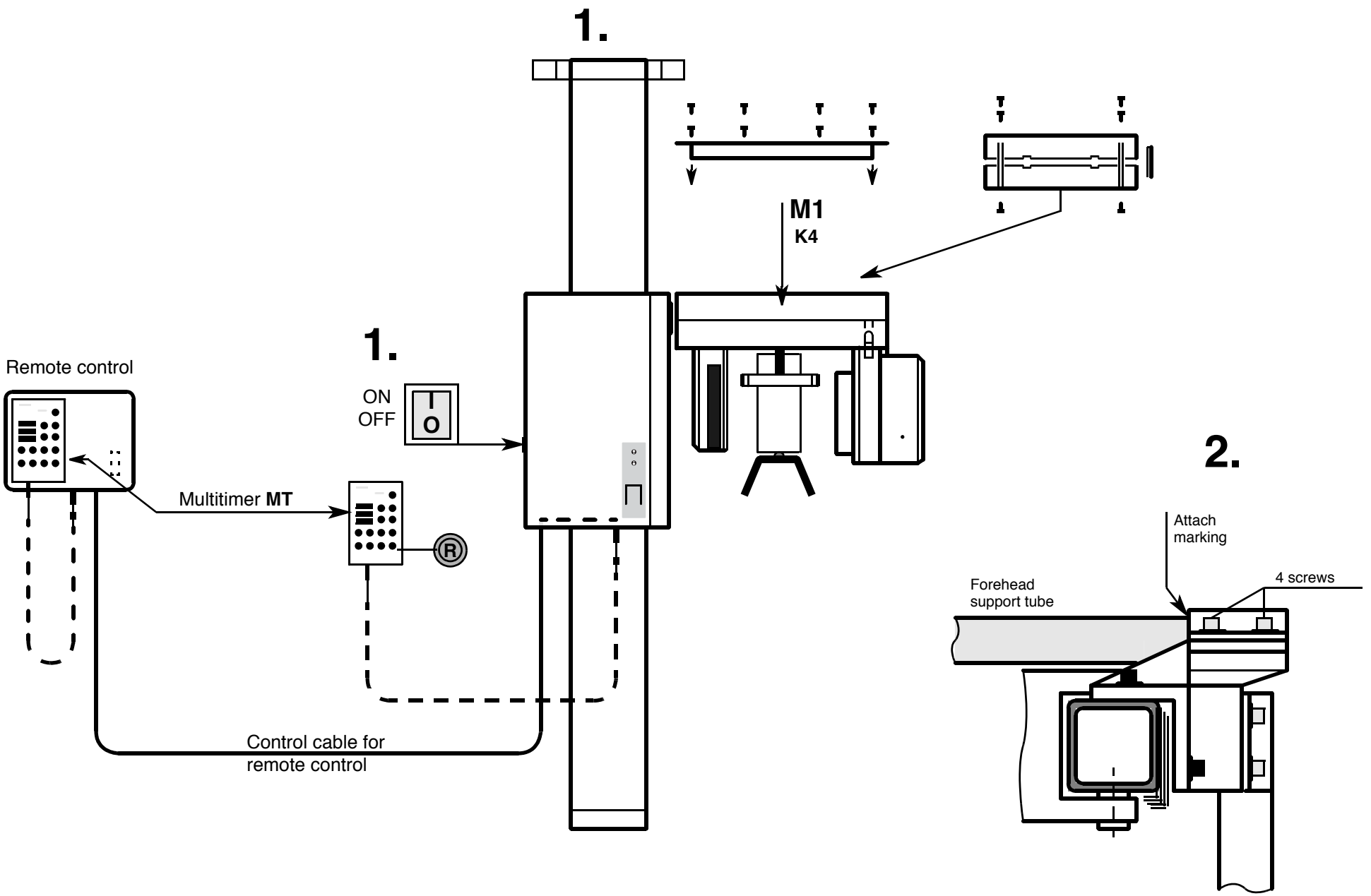

1.
M1
K4
1.
ON
OFF
Remote control
Multitimer **MT**
Control cable for
remote control
2.
Attach
marking
4 screws
Forehead
support tube

- Unscrew the two covers behind the rotation ring (6 screws).
- Unscrew the rotation ring cover (8 screws).

1. Switch the unit ON. Wait for the unit self-adjusting routine to execute.
Move the unit to a convenient height for working. Switch the unit OFF.

2. Forehead support: Mark the position of the forehead support tube.
Loosen the four screws and pull out the forehead support.

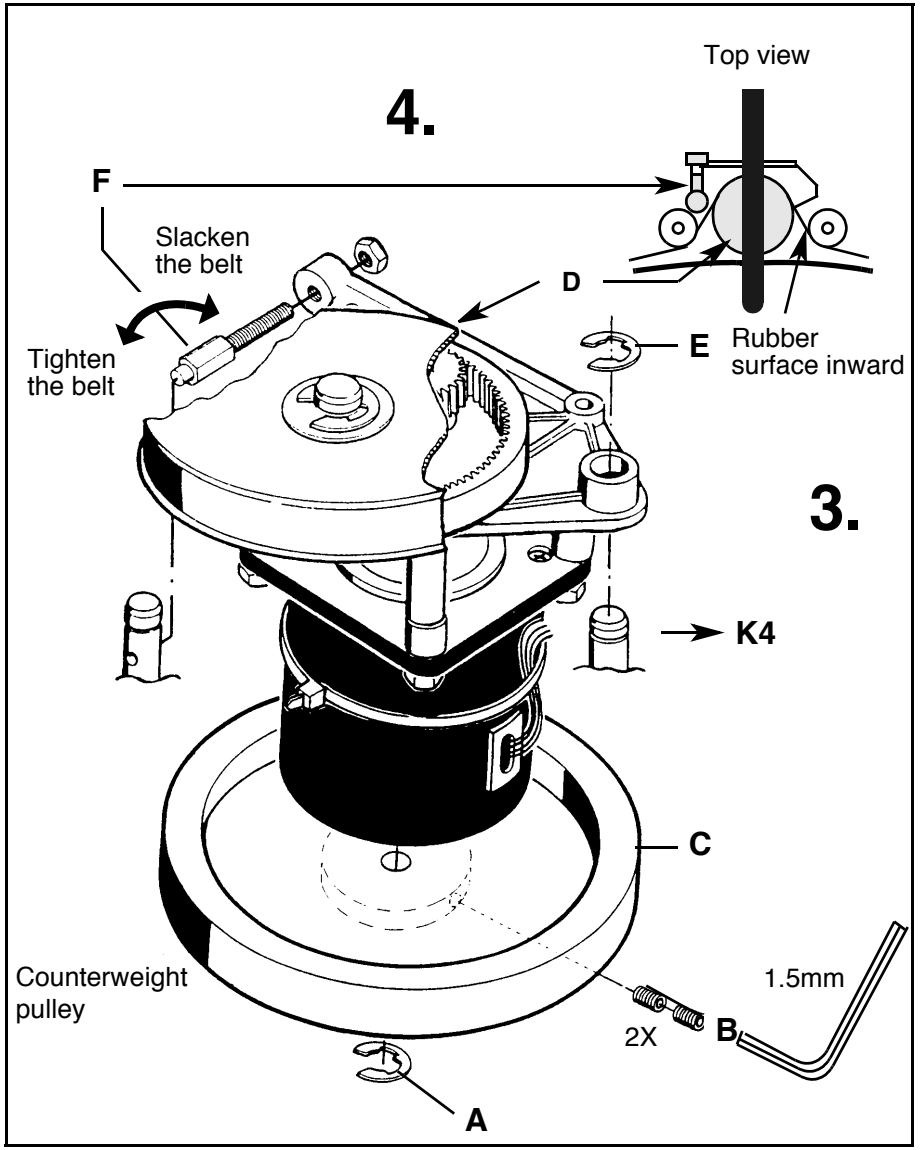
3. Replace motor M1:

- Separate plug K4.
- Pull off safety ring **A**.
- Unscrew threaded pin **B**.
- Take out counterweight pulley **C** from below.
- Turn belt tensioning bolt **F** until belt is loosened.
- Take flat belt off pulley **D** (rubber coating inside, position adhesive position over tube unit).
- Pull off safety ring **E**.
- Take out complete motor M1 from above.
- Install new motor. Feed flat belt correctly over rollers.
- Attach counterweight pulley and secure with the two threaded pins **B**.
- Couple plug connection K4.

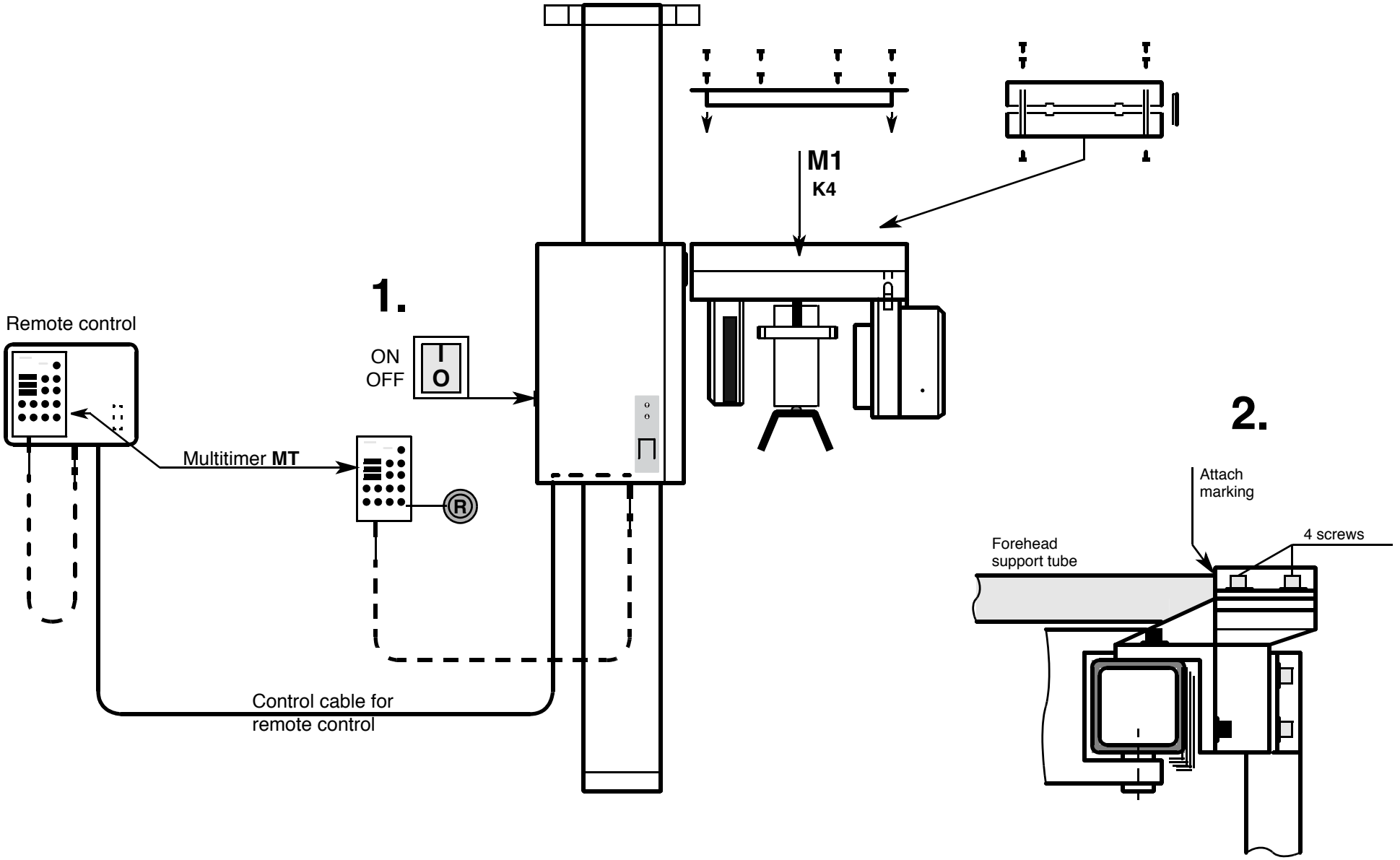
4. Adjust flat belt:

- Switch the unit ON. Wait for the unit self-adjusting routine to execute.
- Manually turn x-ray head to the middle rotation position.
- Hold the X-ray head by hand and press the **R** key on the Multitimer.
- At the same time, turn the belt tensioning bolt **F** (tighten) until the belt no longer slips.

Continued on next page



6.1 Replacing the rotation motor M1


M1
K4
1.
Remote control
ON
OFF
Multitimer MT
R
Control cable for
remote control
2.
Attach
marking
4 screws
Forehead
support tube

Continued

- **If error code E3 33 is displayed:**
- Press the **R** key on the Multitimer.
- The error code **E3 33** display goes out.
- Press the **R** key on the Multitimer and continue the procedure for tightening the belt.

5. Perform the rotation test:

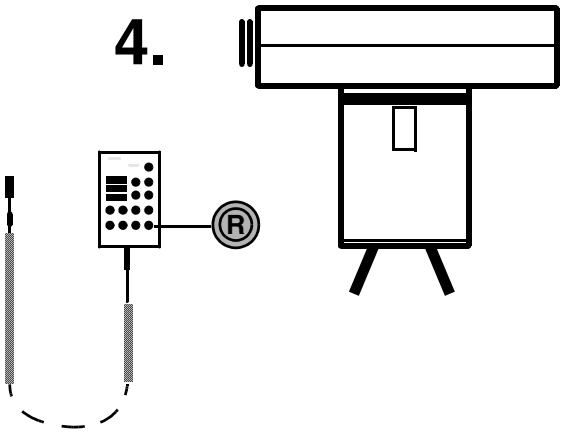
- Manually rotate the X-ray head to the rotation start position.
- Press the T key on the Multitimer.
- The test rotation must take place uniformly and smoothly.
  (perform test rotation 3 – 4 times).

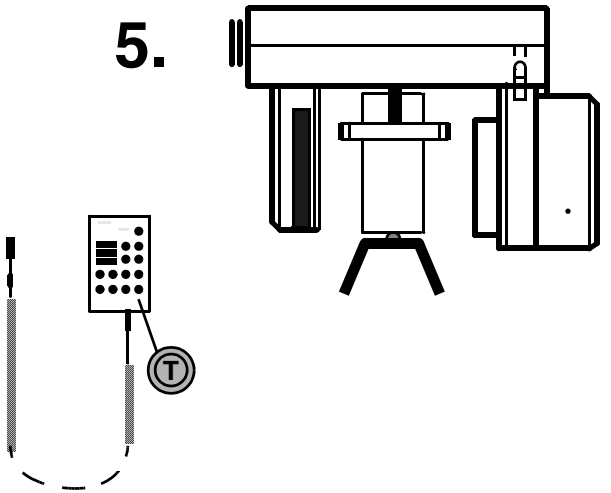
- Attach the counternut to the belt tensioning bolt **F**.

- Insert the forehead support up to the marking and tighten it down.
  The forehead support tube must be vertical (use a spirit level)!

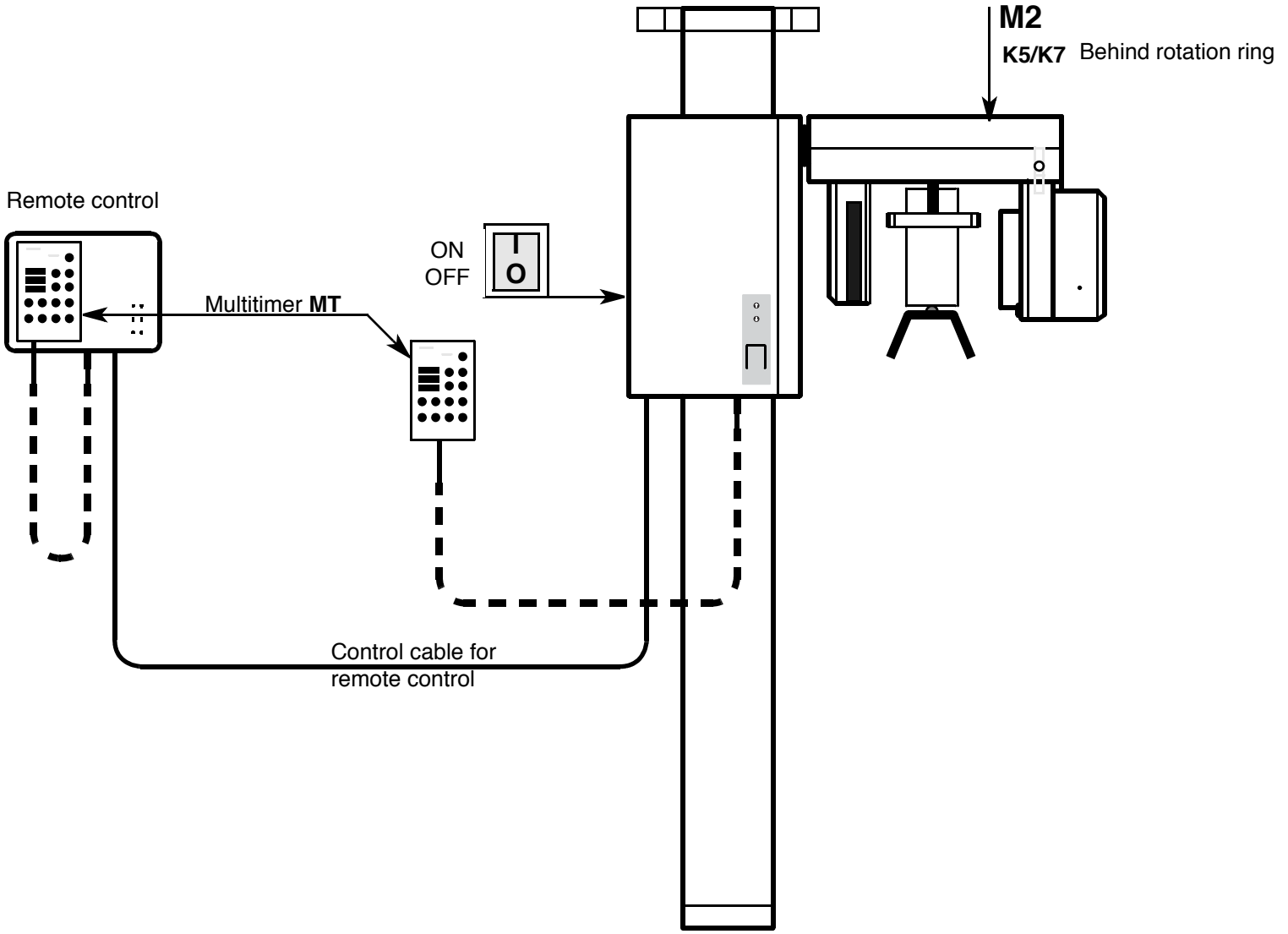
- Completely equip the unit.

- Final check:
  Take a phantom exposure. Proceed as in the section
  'Phantom Radiograph – Adjusting Actuator M2' see page 4 - 5.





6.1 Replacing the rotation motor M1


M2
K5/K7 Behind rotation ring
Remote control
ON
OFF
Multitimer **MT**
Control cable for
remote control

- Switch ON the unit.
  Move the unit to a convenient position for working. Switch OFF the unit.

  After removing the covers, the following steps are required:

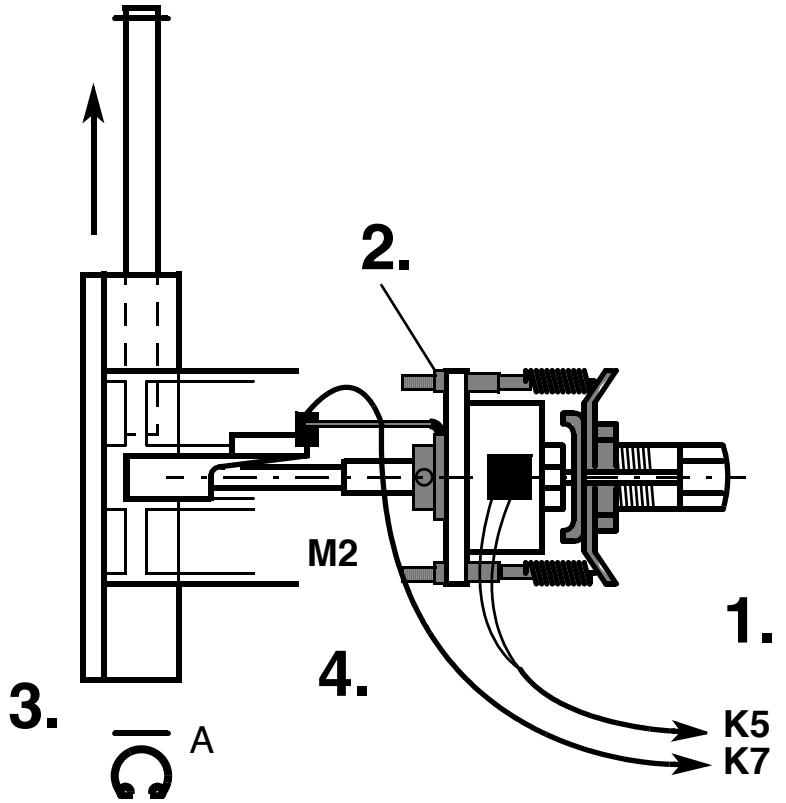
1. Loosen plug connections **K5** and **K7**.

2. Unscrew nuts (top and bottom) from spring tensioners.
Push rotation ring away from motor.
Separate spring tensioners from motor with draw springs.

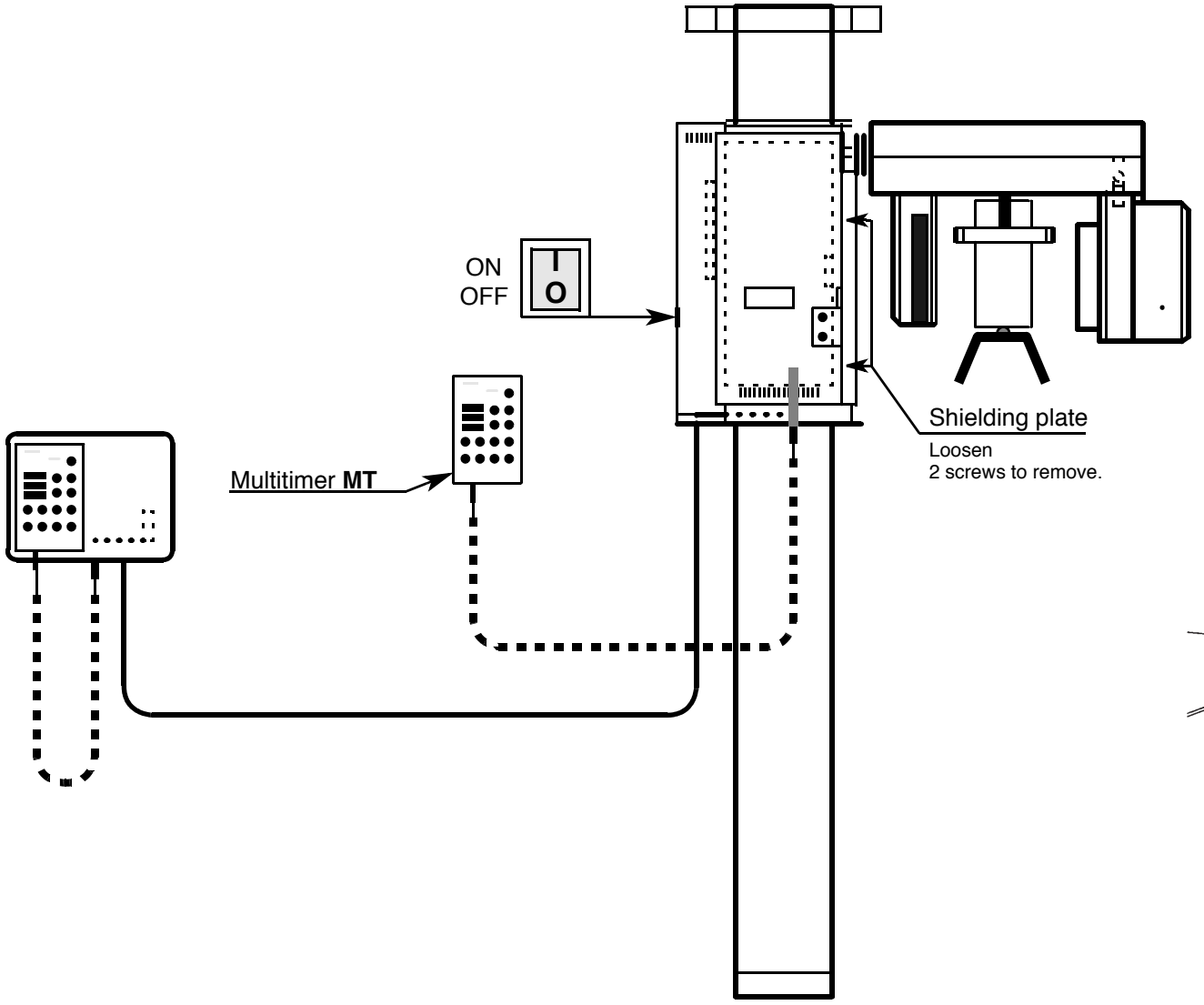
3. Pull safety ring **A** away from axle.
Pull axis out of support arm until you can remove actuator.

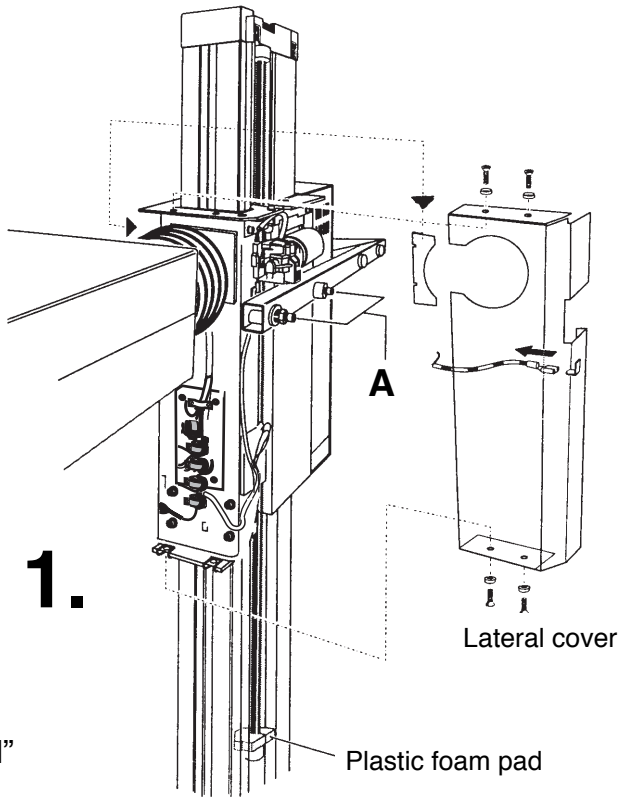
4. Take out actuator.

- Install new actuator.
  Attach safety ring **A** to axis.
- Adjust actuator.
  Proceed as described in the section **'Phantom Radiograph – Adjusting . . . '**.
  ☝ see page 4 - 5.



6.2 Replacing the actuator M2





See section ”Removing Panel”

- The unit remains installed at the wall.
  Switch the unit OFF.

1. Preparations

- Remove the front cover and the lateral shielding plate.
- Remove the lateral cover (grounding!)
- Remove the plastic foam pad.

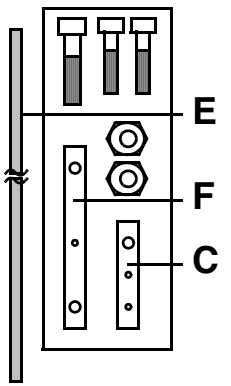
  With ORTHOPHOS 3C:
  Unscrew the cephalometer support arm with Cephalometer:
  Unscrew the two Allen screws **A**.
  Carefully place the support arm with Cephalometer on a soft base.

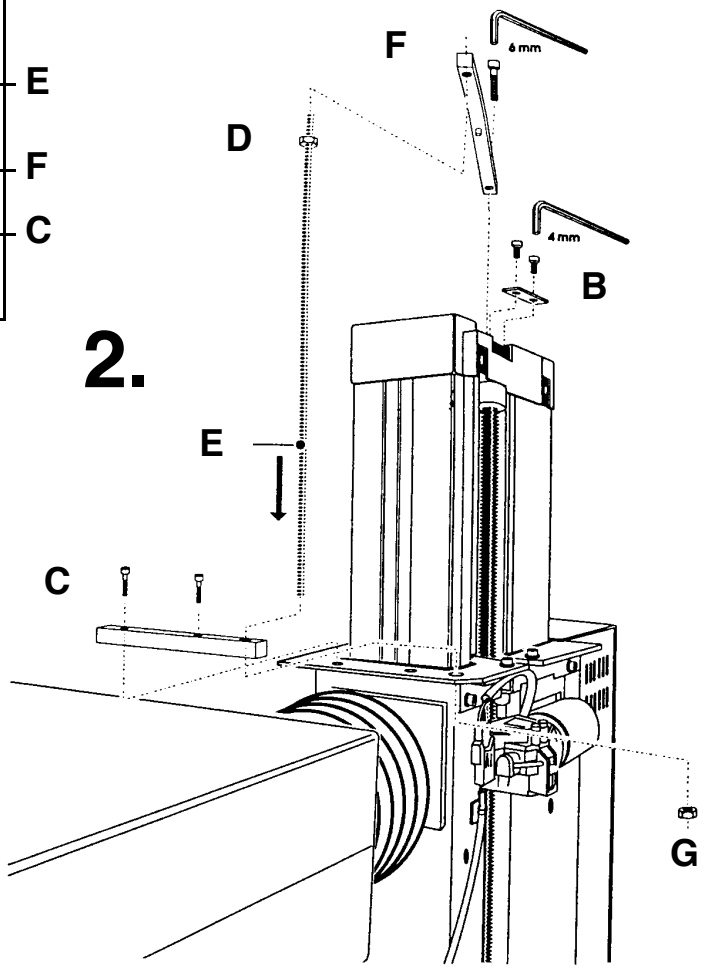
2. Removing the spindle with motor.
The tool set 33 12 068 is needed.

- Unscrew the cover plate **B**.
- Attach the cross bar **C** to the carriage with two M5 Allen screws.
- Screw the lock nut **D** approx. 2 cm on the threaded rod **E**.
- Fit the threaded rod **E** through the holes of the cross bar **C** and the carriage.
- Using an Allen screw, fasten the cross bar **F** diagonally on the headpiece.
- Screw the threaded rod **E** into the cross bar **F** and tighten it with the lock nut **D**.
- Screw the nut **G** on the threaded rod **E** from below.
- Unscrew the set screw **H** and turn the stop socket **X** approx. 5 cm lower.
- Turn the nut **G** upwards until the threaded rod **E** projects out of the headpiece.
- Pull the pin **K** out of the spindle and remove 3 disks.
- Unplug the motor plug **K13**.
- Unscrew the 4 Allen s crews **L**.
- Remove the spindle with motor.

Continued on next page

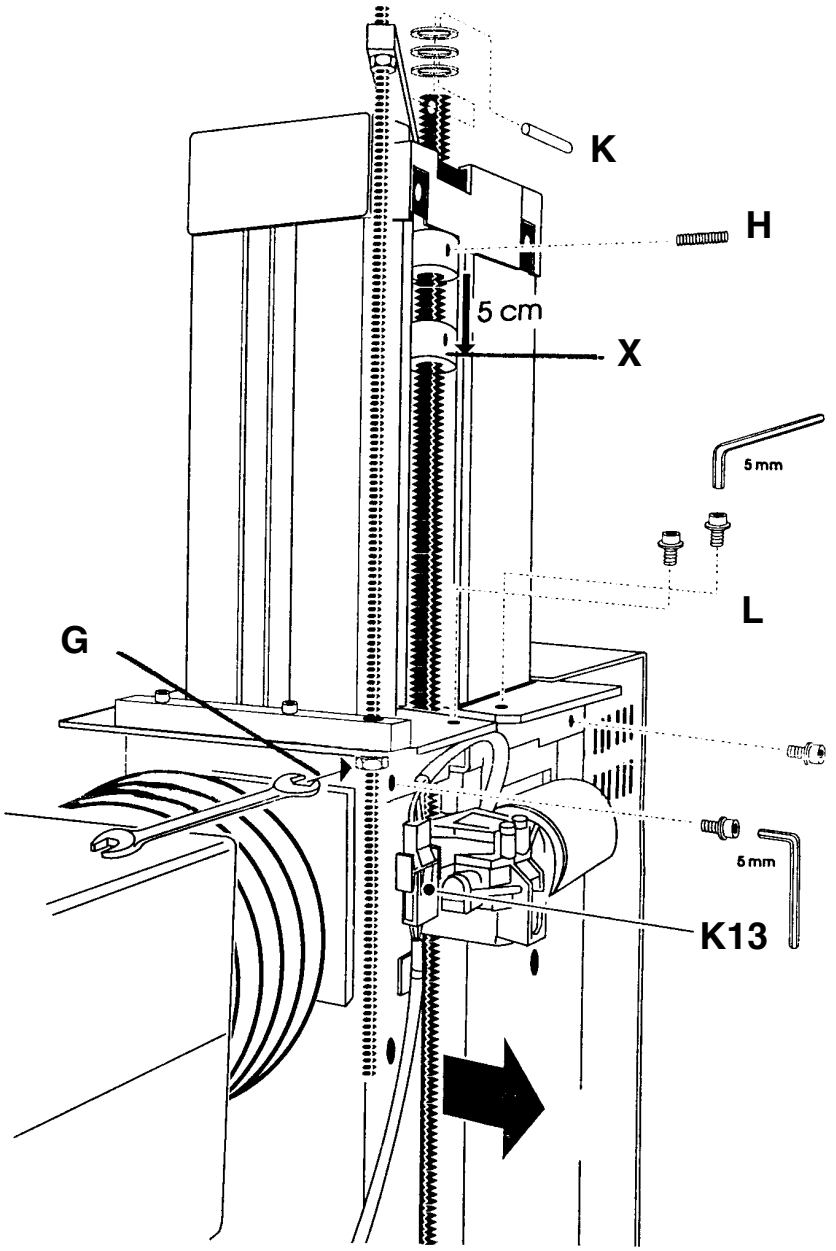
Removal tools
33 12 068

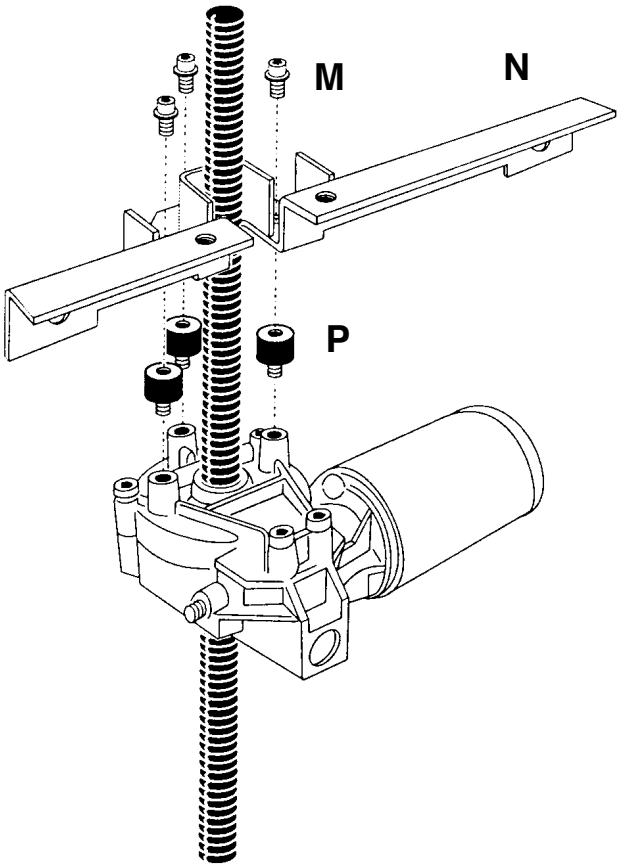




6.3 Replacing the spindle with motor M4 for height adjustment

3.





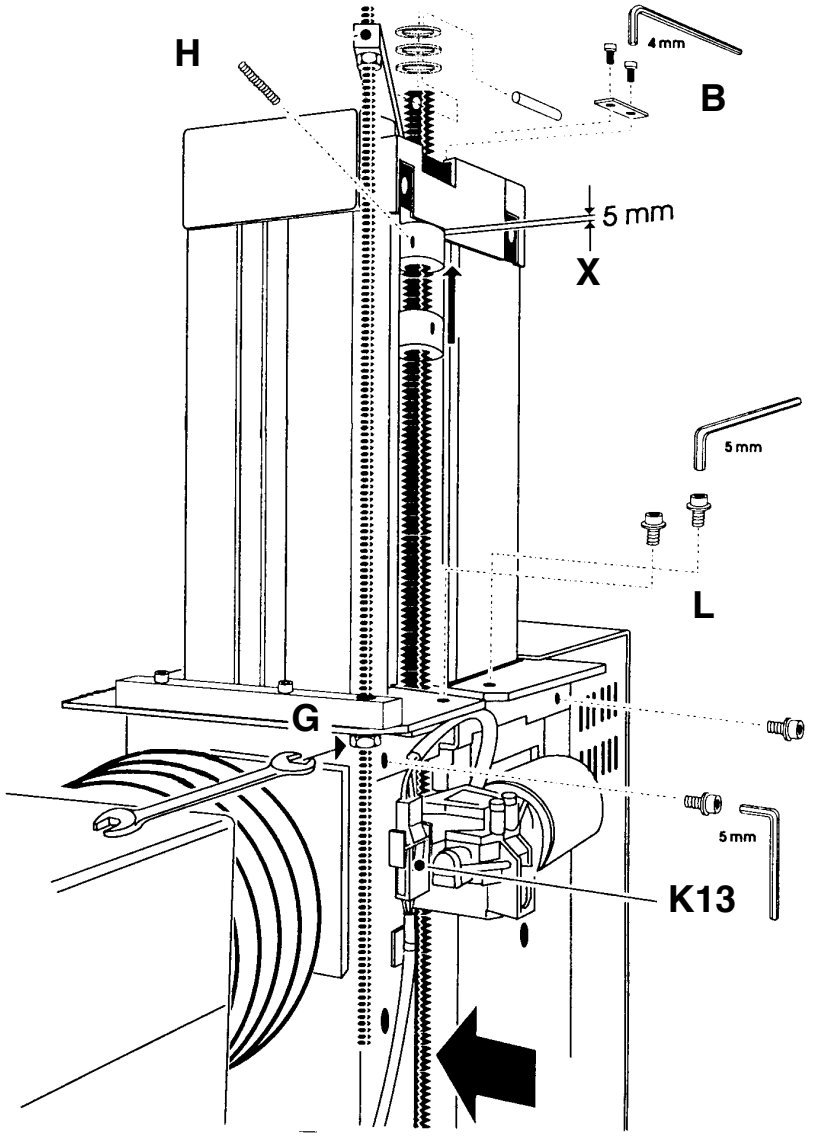
Continued

3. Installing the new spindle/motor.

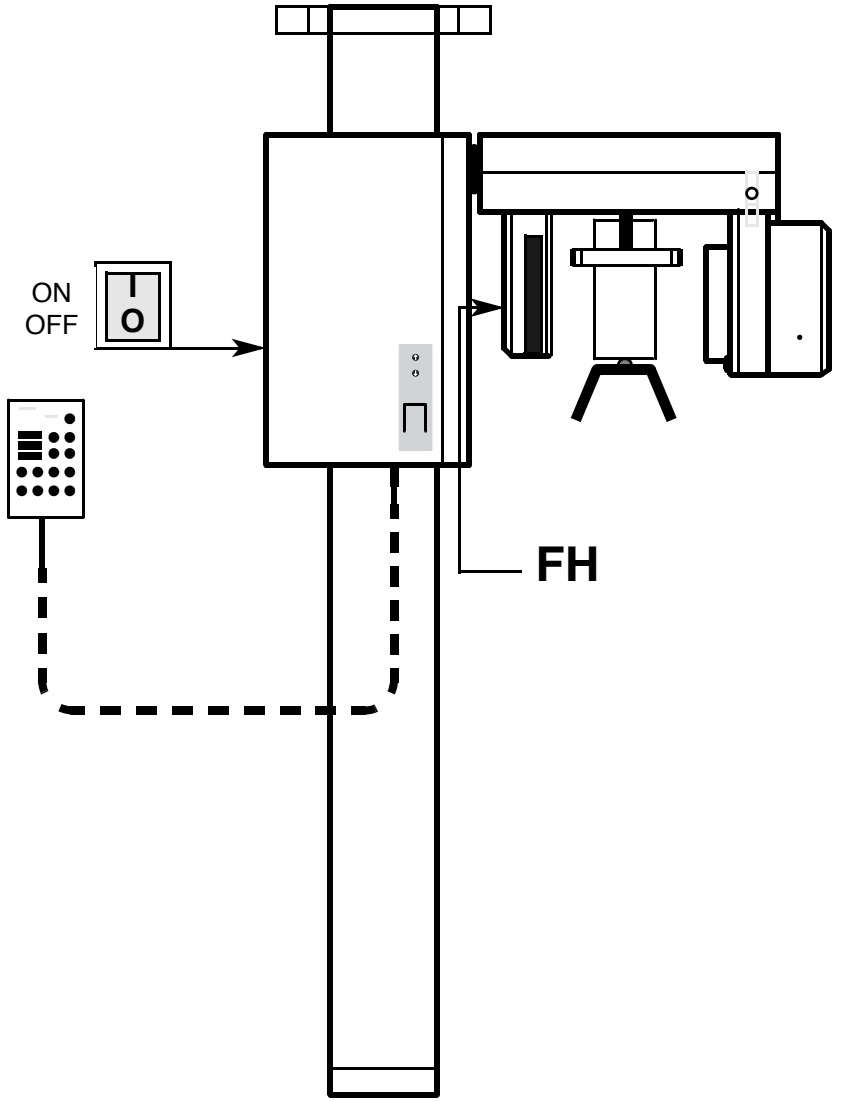
- Unscrew the 3 Allen screws **M** from the removed spindle/motor and remove the motor bracket **N**.
- Remove the 3 gimetal bearings **P**.
- Install the 3 metal bearings **P**, the motor bracket **N** and the 3 Allen screws **M** on the new spindle/ motor.
- Fasten the spindle/motor in the stand and attach the motor bracket **N** to the carriage with 4 Allen screws **L**.
- Put three disks on the spindle.
  The **plastic foam pad** must be in the **center**.
- Insert the setscrew **K** into the spindle.
- Turn the nut **G** downwards and unscrew it from the threaded rod.
- Attach the cover plate **B**.
- Turn the stop socket **X** upwards.
  There must be a clearance of approx. 5 mm between the socket and the head piece.
- Lock the socket **X** with the setscrew **H**.
- Detach the removal tools.
- Fit the motor plug **K13** .

4. Concluding work

- Fit the plastic foam pad on the spindle.
- Install the covers.
  Don't forget to connect the ground wire!
- With ORTHOPHOS 3 Ceph: Install the Cephalometer support arm with cephalometer.
  See ORTHOPHOS 3 Ceph Mounting Instructions!
- Switch the unit ON and check function.
- With ORTHOPHOS 3 Ceph: ”Verify the Symmetry on the Cephalometer”.
  See ORTHOPHOS 3 Ceph Mounting Instructions!



6.3 Replacing the spindle with motor M4 for height adjustment


ON
OFF
FH

Take anti-static measures to prevent ESD damage!

- Turn the unit OFF.

1. Take out screw **A** and remove the cover.

2. Disconnect plug **K15** (L4 and L15).

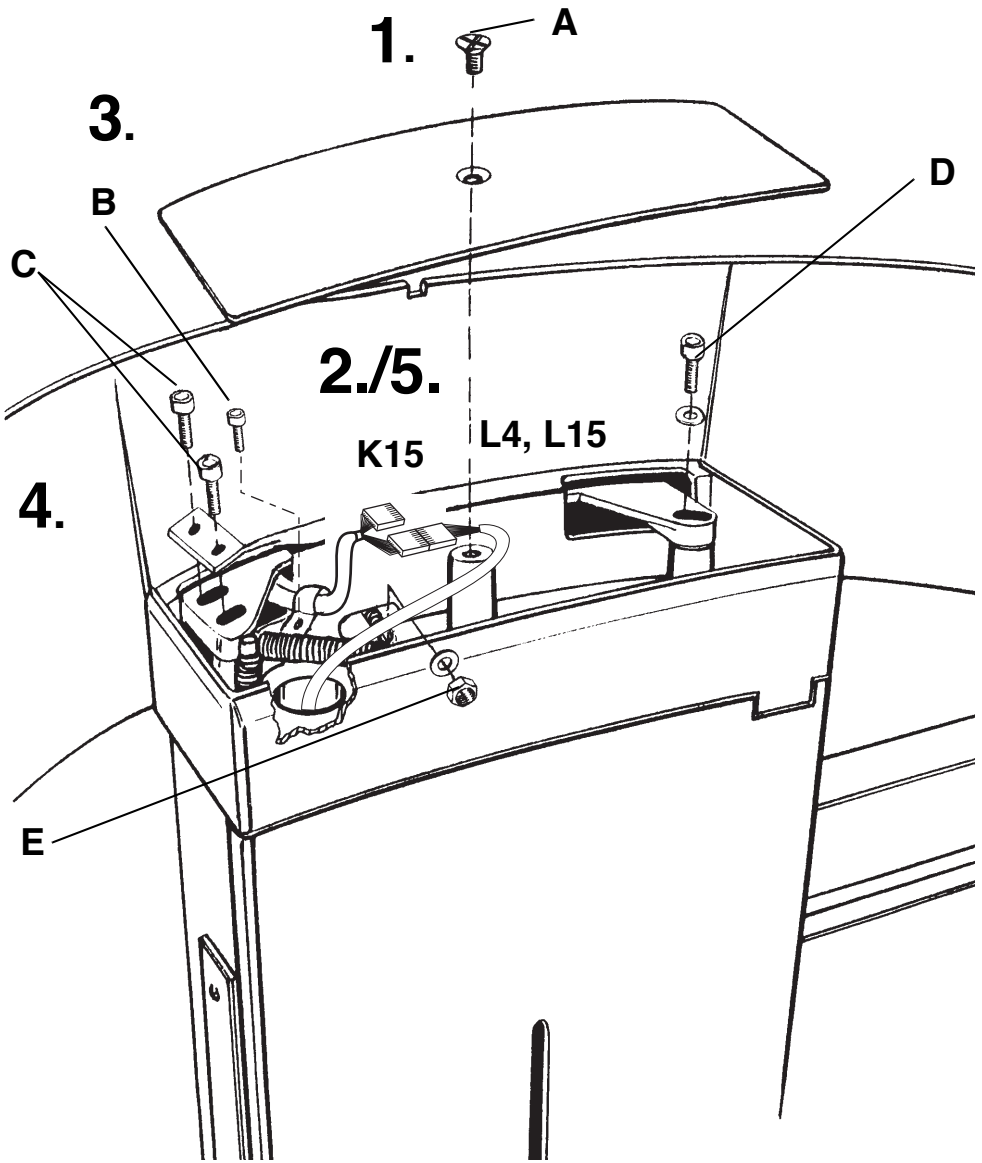
3. Unscrew the cable clamp (screw B).

4. Remove screws **C**, **D** and nut **E**;
while watching for shims and washers!
Attention: Hold and remove the cassette holder.

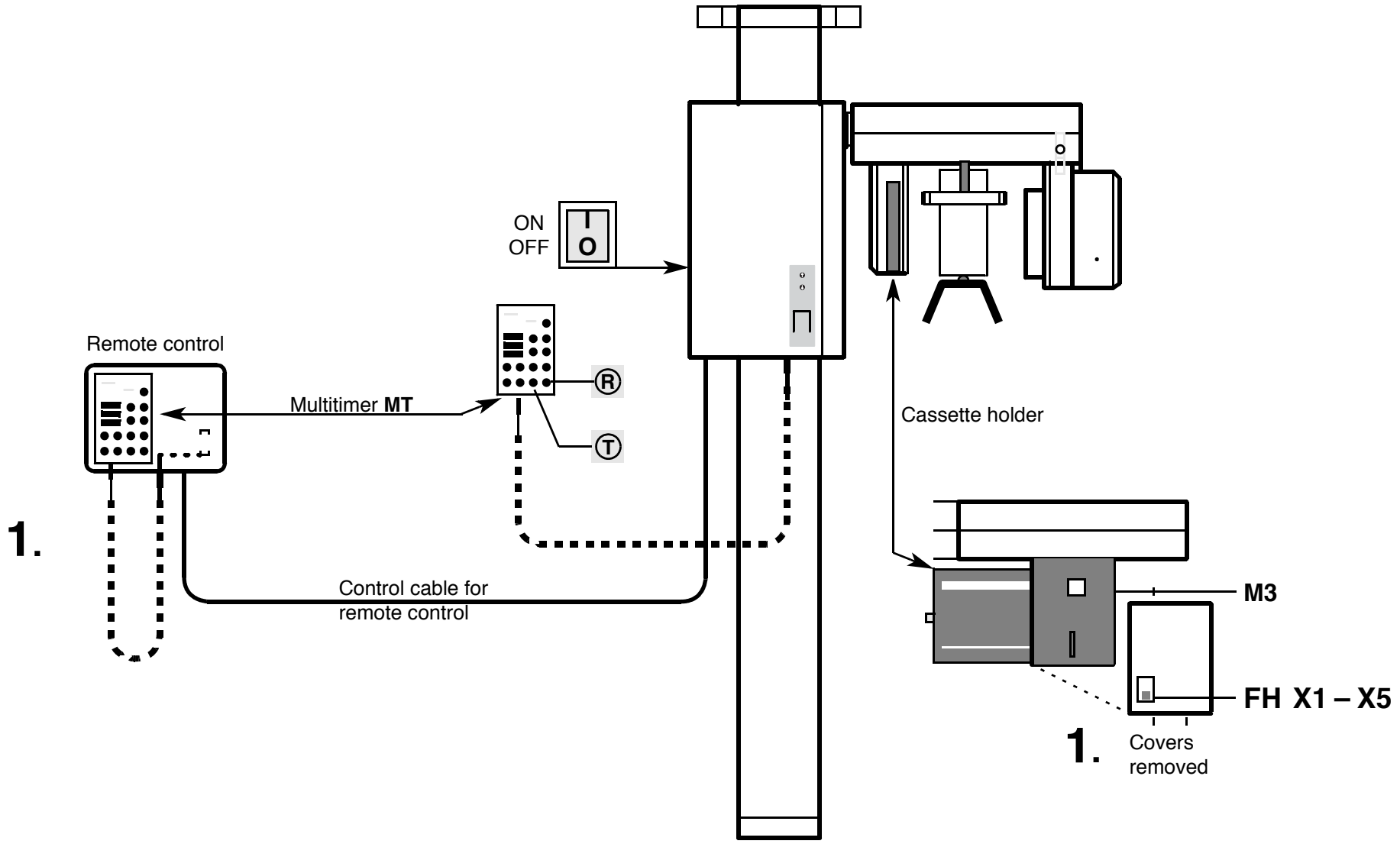
5. Screw on the new cassette holder.
Connect L4 and L15 (connector K15).
Remount the cable clamp.
Replace the cover and insert screw **A**.

6. Tighten the screw of the cover.

- Adjust the cassette holder.
Proceed according to section '**Phantom radiograph**' from step 4, ☝ see page 4 - 5.



6.4 Replacing the cassette holder for Panorama radiography


ON
OFF
I
O
Remote control
Multitimer **MT**
R
T
Cassette holder
1.
Control cable for
remote control
M3
FH X1 – X5
1.
Covers
removed

Take anti-static measures to prevent ESD damage!

Replacing the rope:

- Turn the unit OFF

1. Remove the cover from the cassette holder.

2. Take out screws **A** and remove the secondary diaphragm.

3. Remove 2 screws and the profile metal sheet.

4. Remove screws **B** and the profile metal sheet.

5. Remove screws **C** and the profile metal sheet.

6. Pull out the guide shaft with the O rings.

7. Unhook the tension spring with holding bracket **F** and the rope with holding bracket **E**.
Pull the profile metal sheet **D** from its guide.
Remove the tension spring from the rope and attach it to the new rope.

8. Place the profile metal sheet **D** in the guide and slide it in 20 mm.

9. Wind the (new) rope around the guiding groove of the guide shaft and hook it to the holding brackets **E + F**.

10. Pull the rope with holding bracket **E** through the profile metal sheet **D**.

11. Slide the profile metal sheet **D** halfway onto the guide roller.

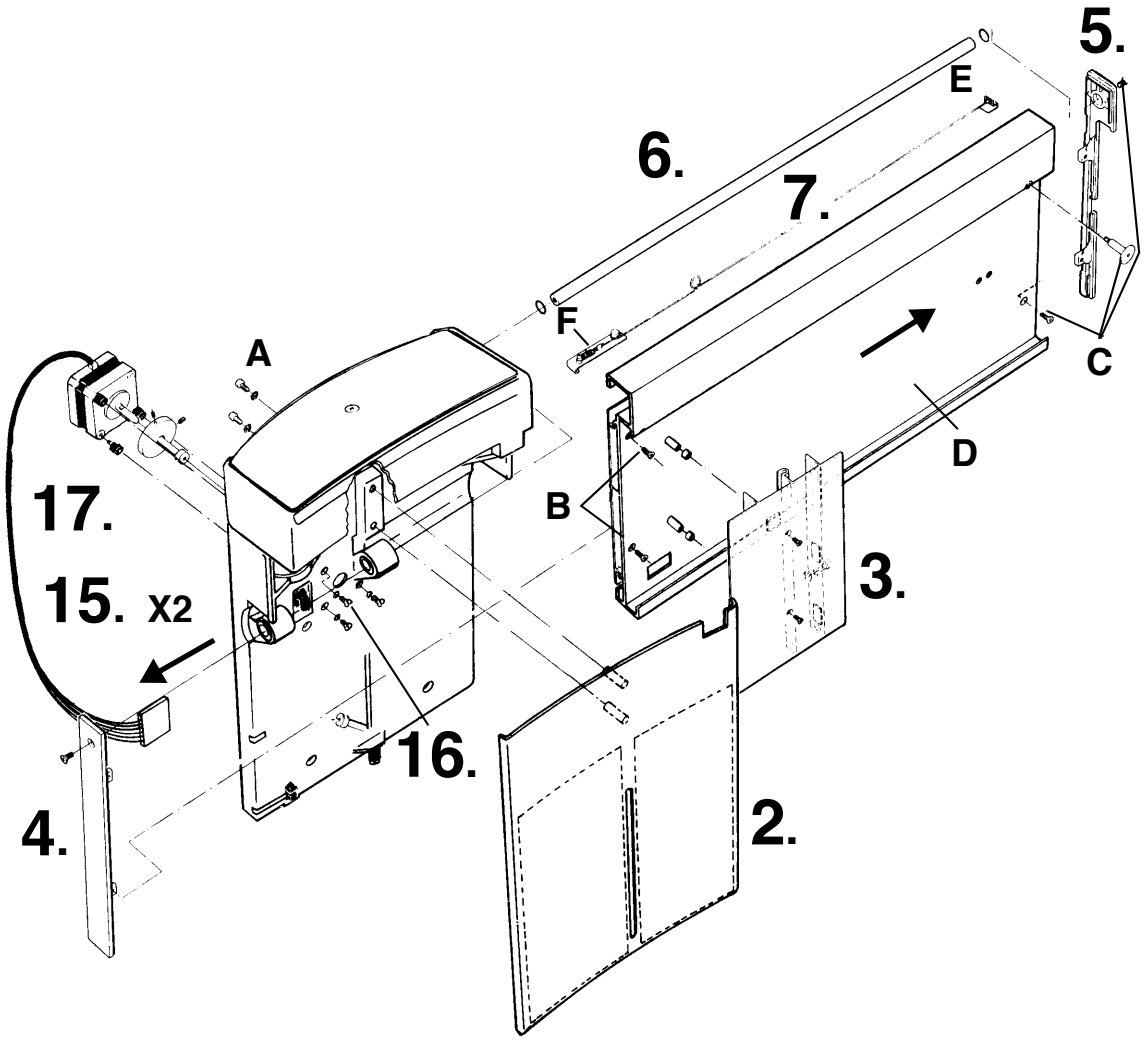
12. Hook the holding bracket **E** with the rope into the profile metal sheet.

13. Wind the rope around the peg on holding bracket **F** and engage the tension spring.
Hook the holding bracket **F** into the profile metal sheet.

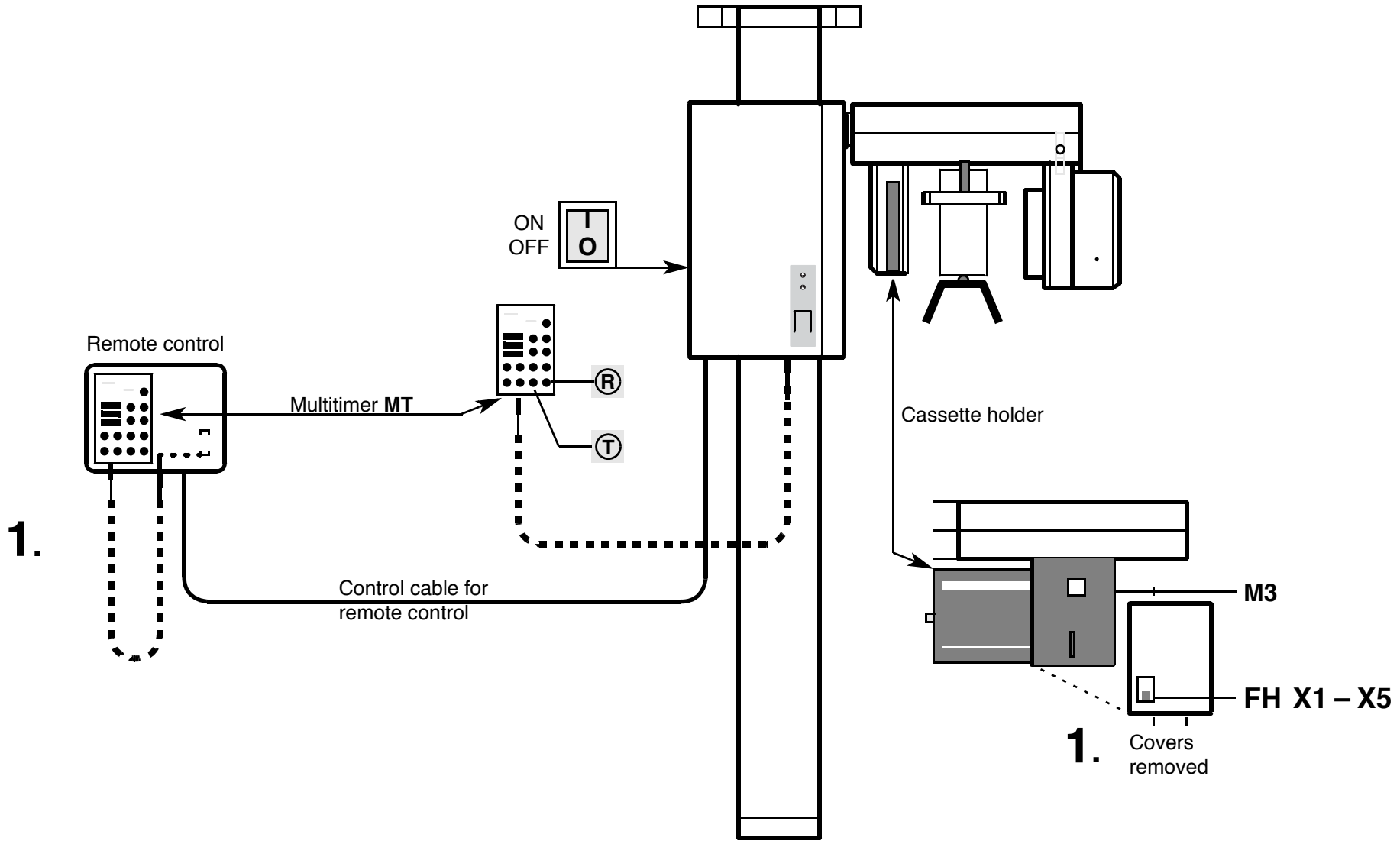
14. Insert the guide shaft and place the O rings on both ends of the shaft.
Secure both lateral profile metal sheets with screws.

- Completely assembly the cassette holder.

Continued on next page



6.5 Replacing the rope and/or the cassette drive motor M3


ON
OFF
I
O
Remote control
Multitimer **MT**
R
T
Cassette holder
1.
Control cable for
remote control
M3
FH X1 – X5
1.
Covers
removed

Continued

Take anti-static measures to prevent ESD damage!

Replacing motor M3:

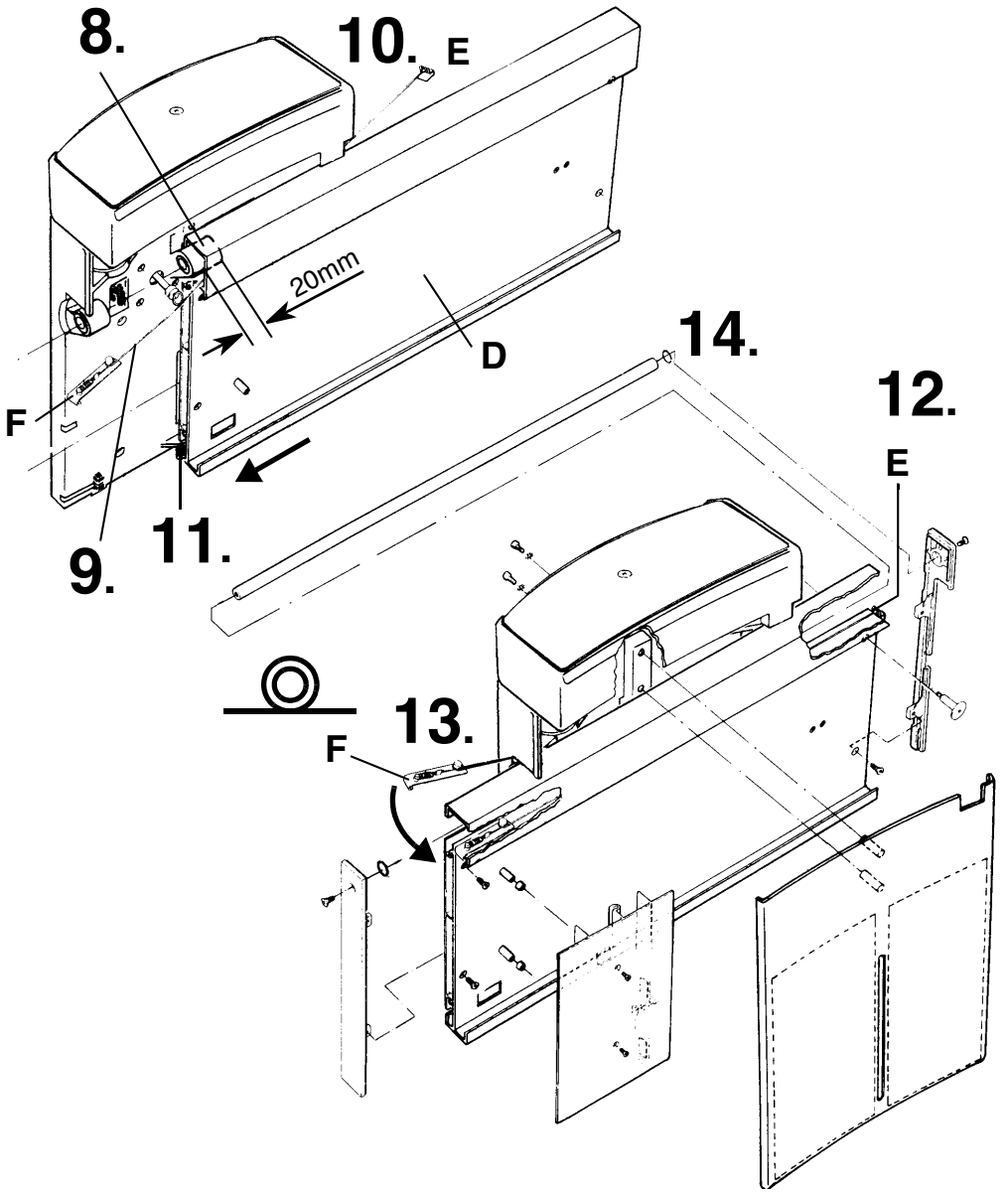
- Proceed according to steps **1. – 7.** above.

15. Unplug connector X12.

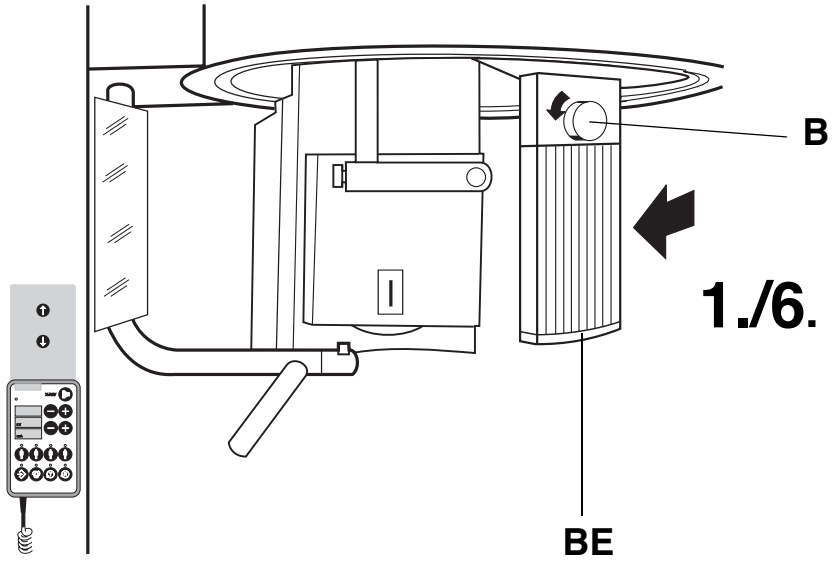
16. Take out the counter-sunk screw and remove the motor.

17. Take out the worm screws and pull out the drive shaft.

- Install the new motor.
- Now proceed according to steps **8. – 14.** above.



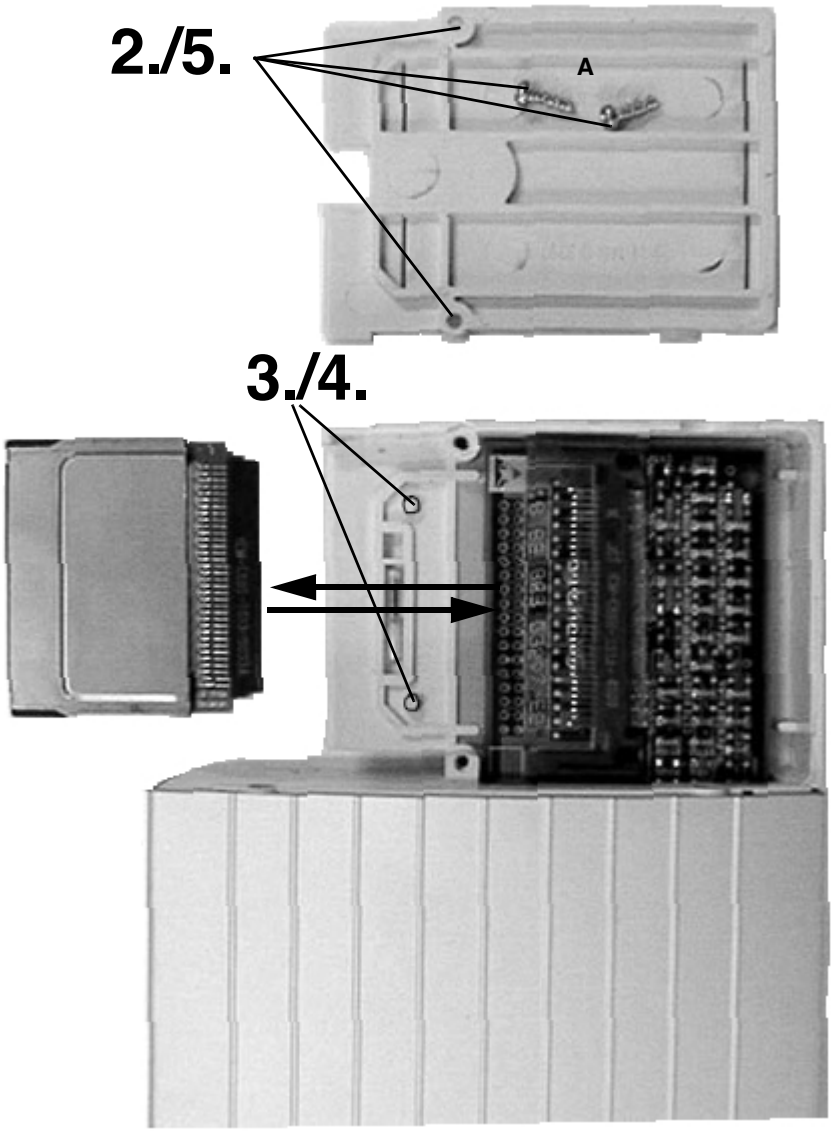
6.5 Replacing the rope and/or the cassette drive motor M3


B
1./6.
BE

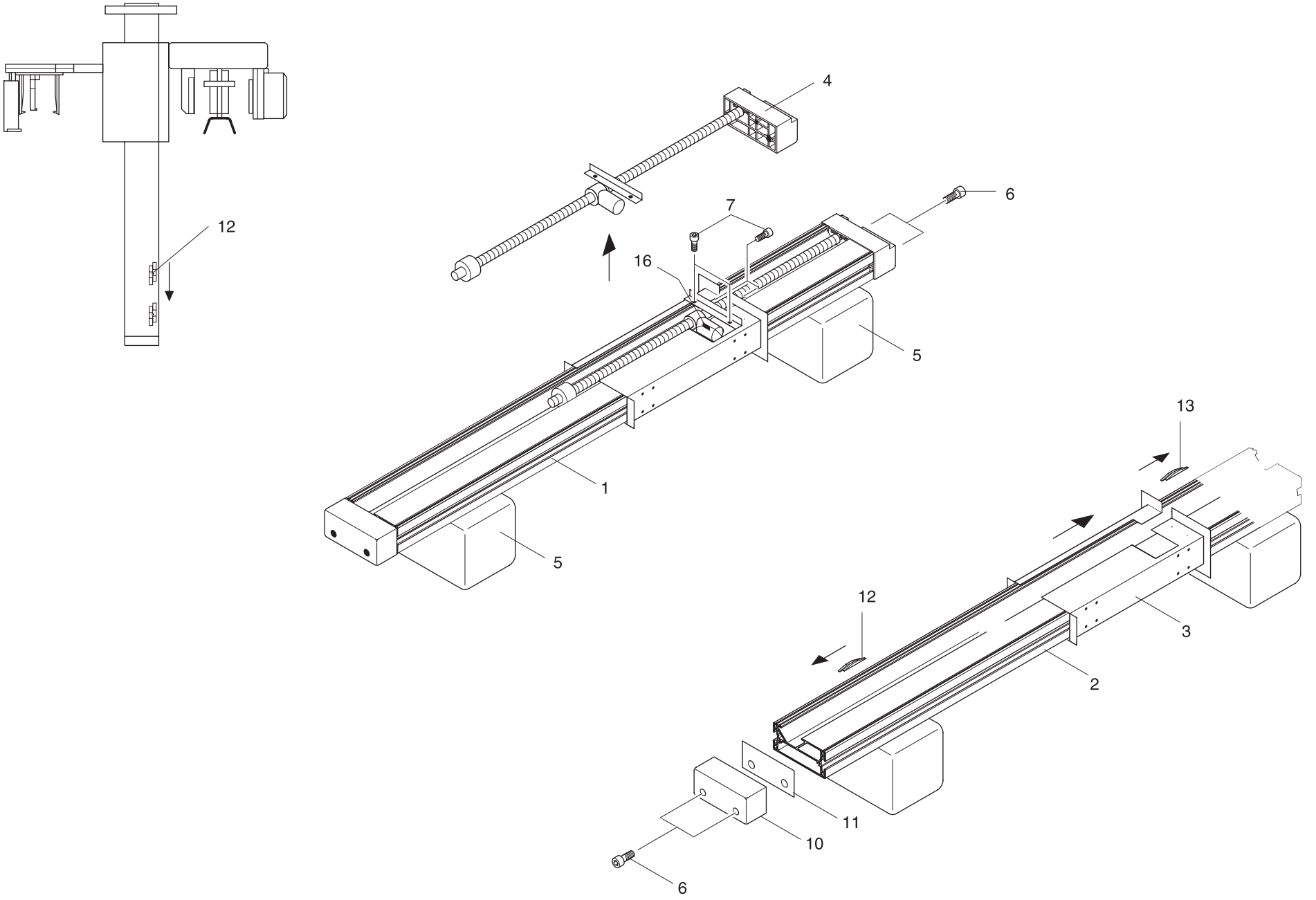
1. To remove the image receptor turn control knob **B** to the right and pull out the image receptor.
2. Unscrew the two screws **A**. Take off the cover.
3. Lift socket contact of image receptor slightly, since it is attached to the housing.
   Then pull the socket contact off.
4. Attach the new socket contact, making sure that the plug connection is correctly attached.
   Press down to engage.
5. Unscrew the cover.
6. Push in the image receptor BE up to the endstop (turn control knob B to the left).
7. Perform the pin position recognition with Service routine S.32.3 for Panorama radiography.
8. Generate a digital test image.
   Press exposure button.
   A rotation without radiation is initiated.
   A dialog box appears.
   If the display
   OK
   appears, the data path is functioning correctly.
   Actuate the **OK** softkey.
   The test image generated is then displayed on the screen.

   If the display
   Error
   appears, see the instructions in the Service Manual.

- Close the test image ([Ctrl]+[F4]).



6.6 Replacing socket contact for image receptor


12
4
7
6
16
5
1
5
13
12
3
2
11
10
6

- ***To install this spare part you will also need the Installation Instructions for ORTHOPHOS 3, order no. 33 34 039, or ORTHOPHOS 3 Ceph, order no. 33 34 120..***

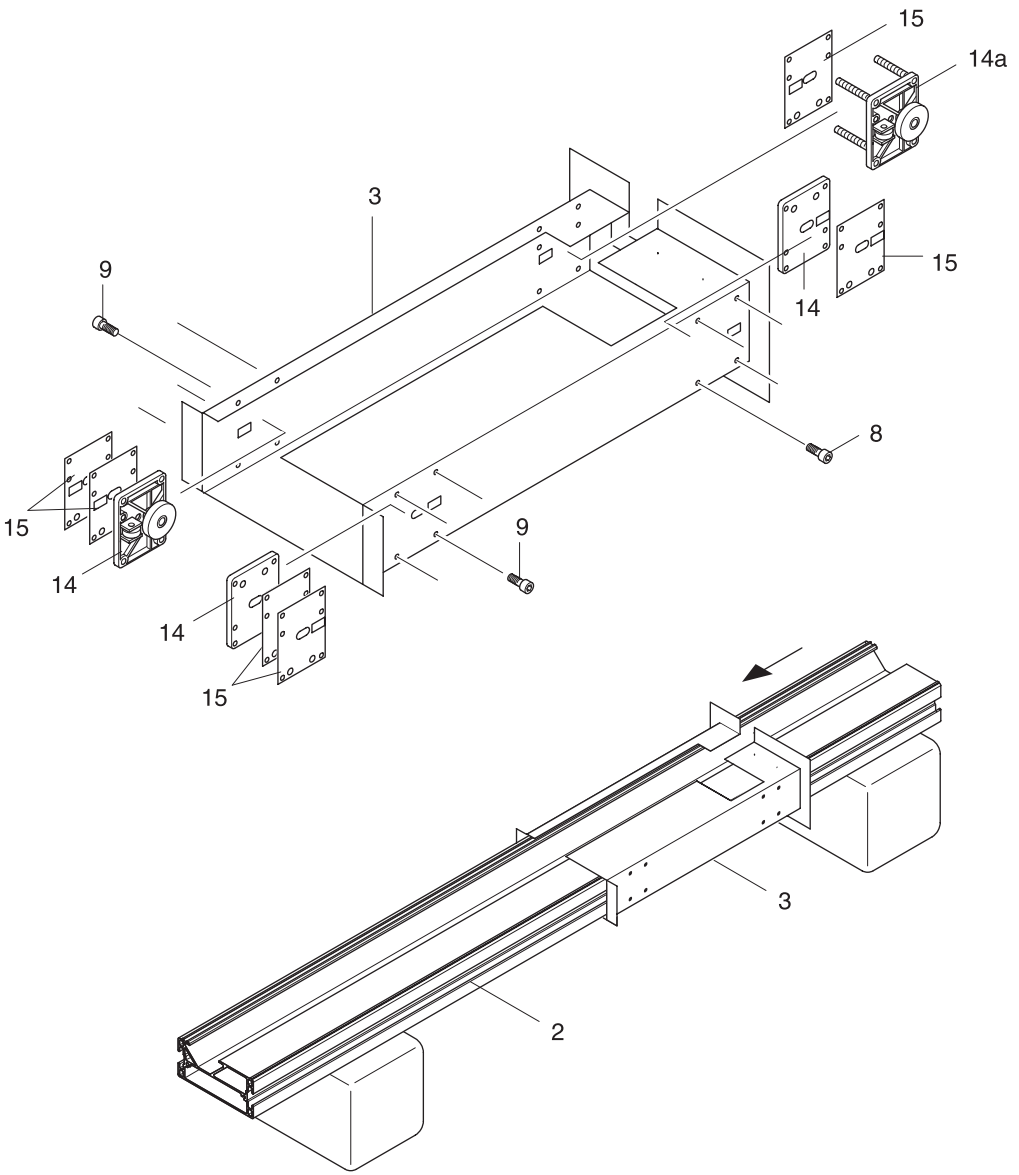
- Loosen the switch ramp (12) (setscrew) and fix it to the bottom mark.

  For the following disassembly steps please refer to the ORTHOPHOS 3 or ORTHOPHOS 3 Ceph, chapters "Making the Plug-in Connections", through to “Installing the Column” in reverse order.
- Remove the polystyrene blocks (5) from the packaging and place them under the stand (1).
- Loosen the screws (6 and 7).
- Disconnect the plug(16).
- Completely remove the drive (4).
- Remove the screws (6) and take off the headpiece (10) and cover plate (11).
- Loosen the switch ramps (12 and 13) (setscrews) and push them out of the column stand (2) section.
- Roll the carriage (3) off the stand in the direction of the arrow.
- Replace the roller support (14) of the carriage (3).
- Insert new compensating plates (15) (8 compensating plates supplied) between the roller seat (14) and the carriage (3) as shown in the drawing and tighten them with the screws (8 and 9) (torque ≥ 5 NM)

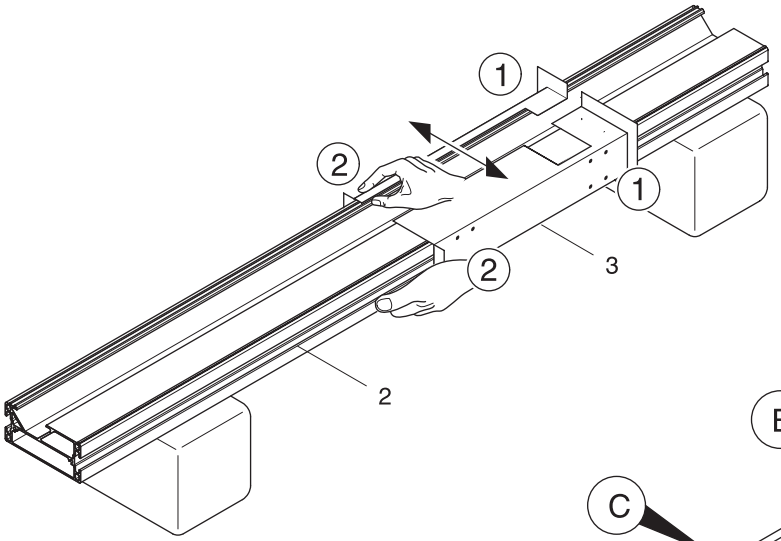
  ATTENTION! Screw M6x12 (item 8) is only to be used for the roller seat with set screw (14a)!

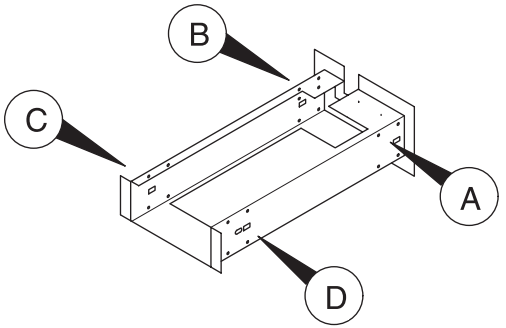
- Slide the carriage (3) onto the replacement stand (2) in the direction of the arrow.

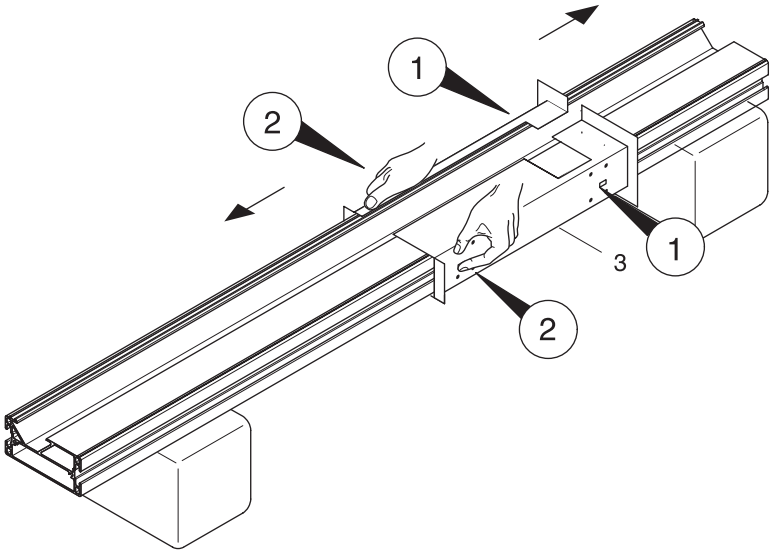
Continued on next page



6.7 Replacing Column Stand


1
2
1
2
3
2


B
C
A
D


1
2
1
3
2

Continued

Checking for play

- While holding the column stand (2), move the carriage (3) towards test point ① and test point ② in the direction of the arrow.
- If there is any free play, install further compensating plates between the roller support and the carriage.

Reducing the play

If an uneven number of compensating plates was required in test area ①, install an additional compensating plate at position **A**.

If an uneven number of compensating plates was required in test area ② install an additional compensating plate at position **C**.

Number of compensating plates at position **A=B+1**

Number of compensating plates at position **C=D+1**

Once the compensating plates have been installed, check for play again.

Checking the roller play

When moving the carriage (3) across the entire length of the stand, it must be possible to hold the rollers in areas ① and ②.

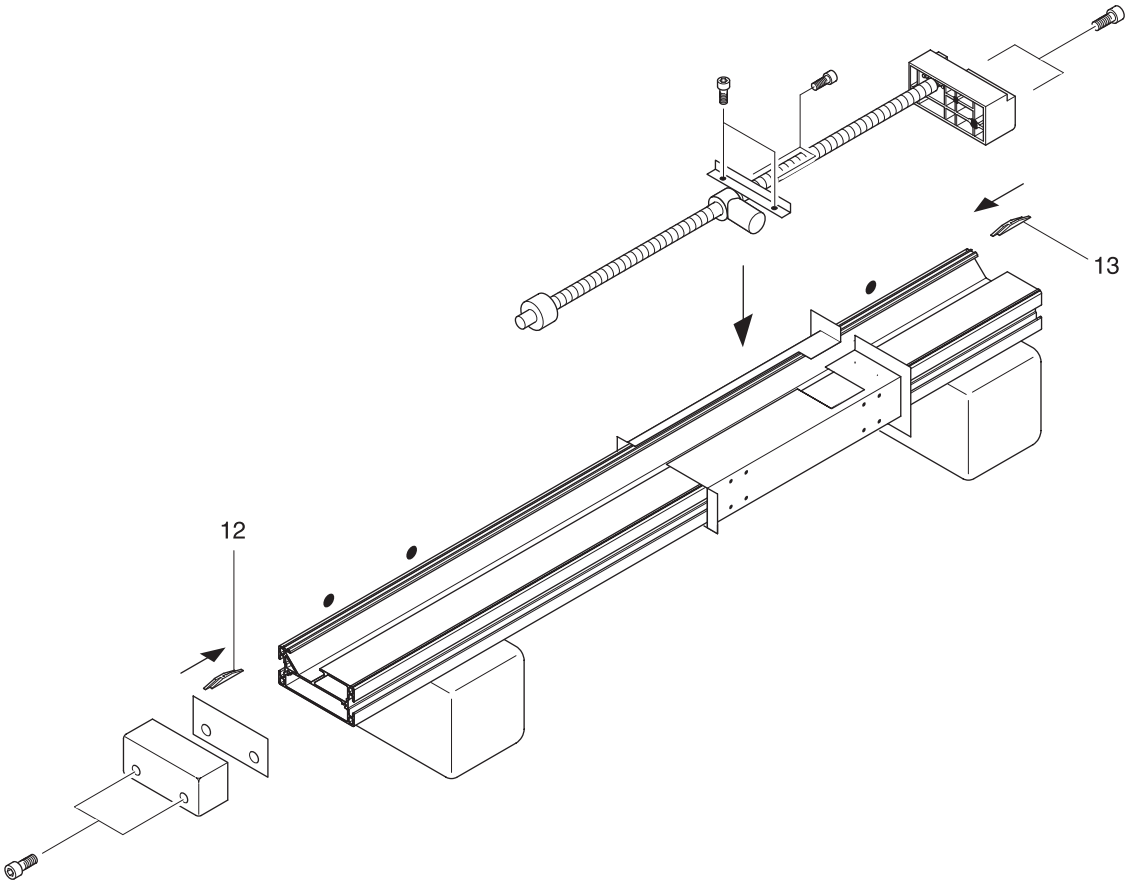
Tighten the switch ramp (12) in the corner of the first mark.

Tighten switch ramp (13) in the center of the mark.

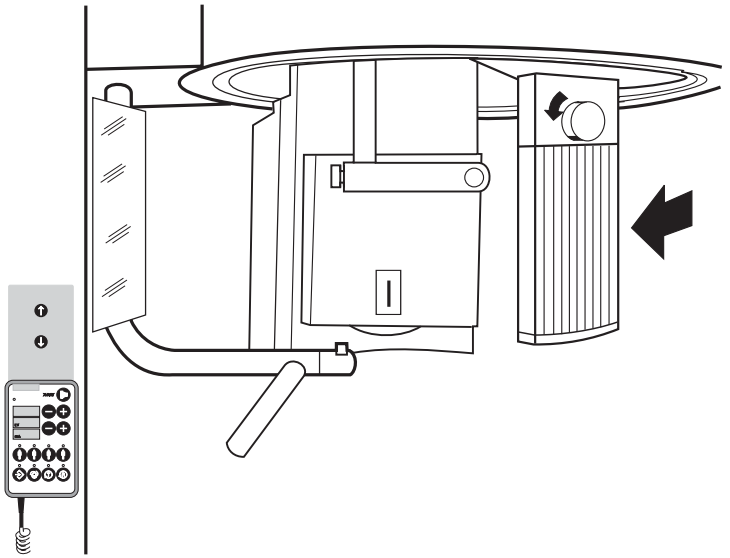
Install the drive spindle and headpiece and reconnect the plug.

Install the headpiece with the cover plate.

Complete all further steps as described in the chapters “Installing the Column” through to “Making the Plug-in Connections” in the ORTHOPHOS 3 or ORTHOPHOS 3 Ceph.



6.7 Replacing column stand



- If the image receptor cannot be screwed in and out easily or fits into the guide too loosely, replace rotary knob or/and sensor ejector.

1. To remove the image receptor, turn rotary knob **B** clockwise and pull out the image receptor.

1.1 Check the sensor ejector for any damages on the teeth; if they are damaged, replace sensor ejector.

1.2 Remove two screws **D**. Replace sensor ejector.

2. Replace rotary knob **B**

2.1 Unscrew upper cover **A**.

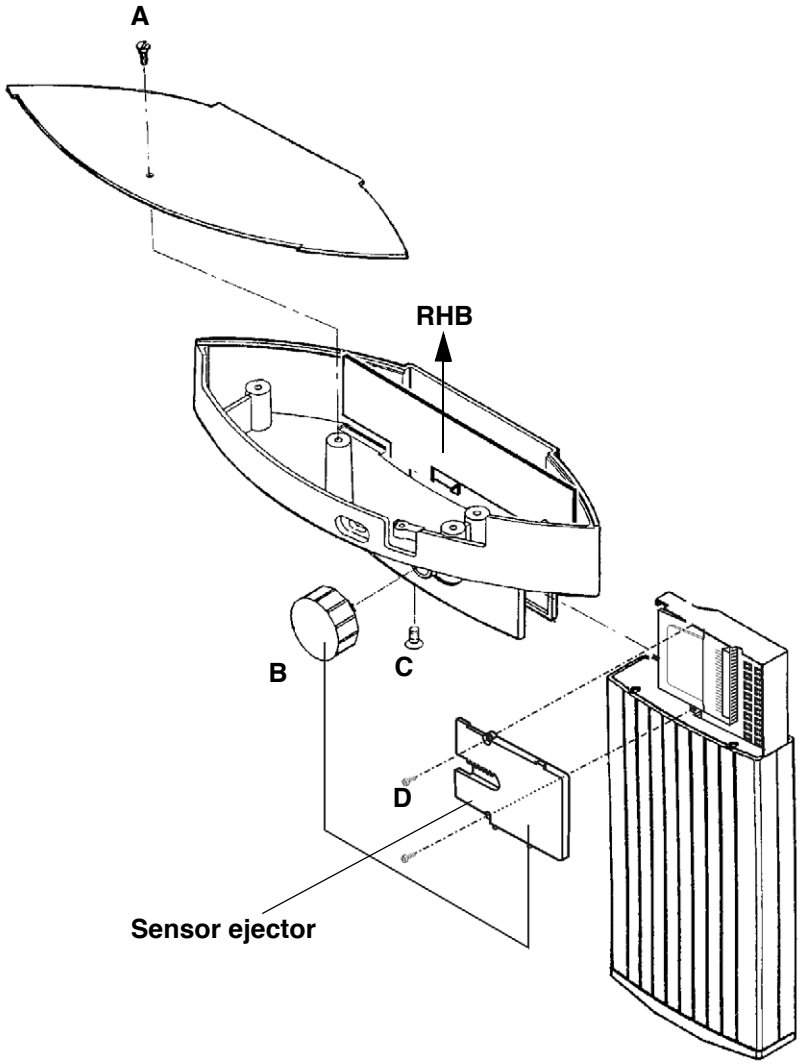
2.2 Remove lower Torx screw **C**.

2.3 Lift PCB RHB slightly.

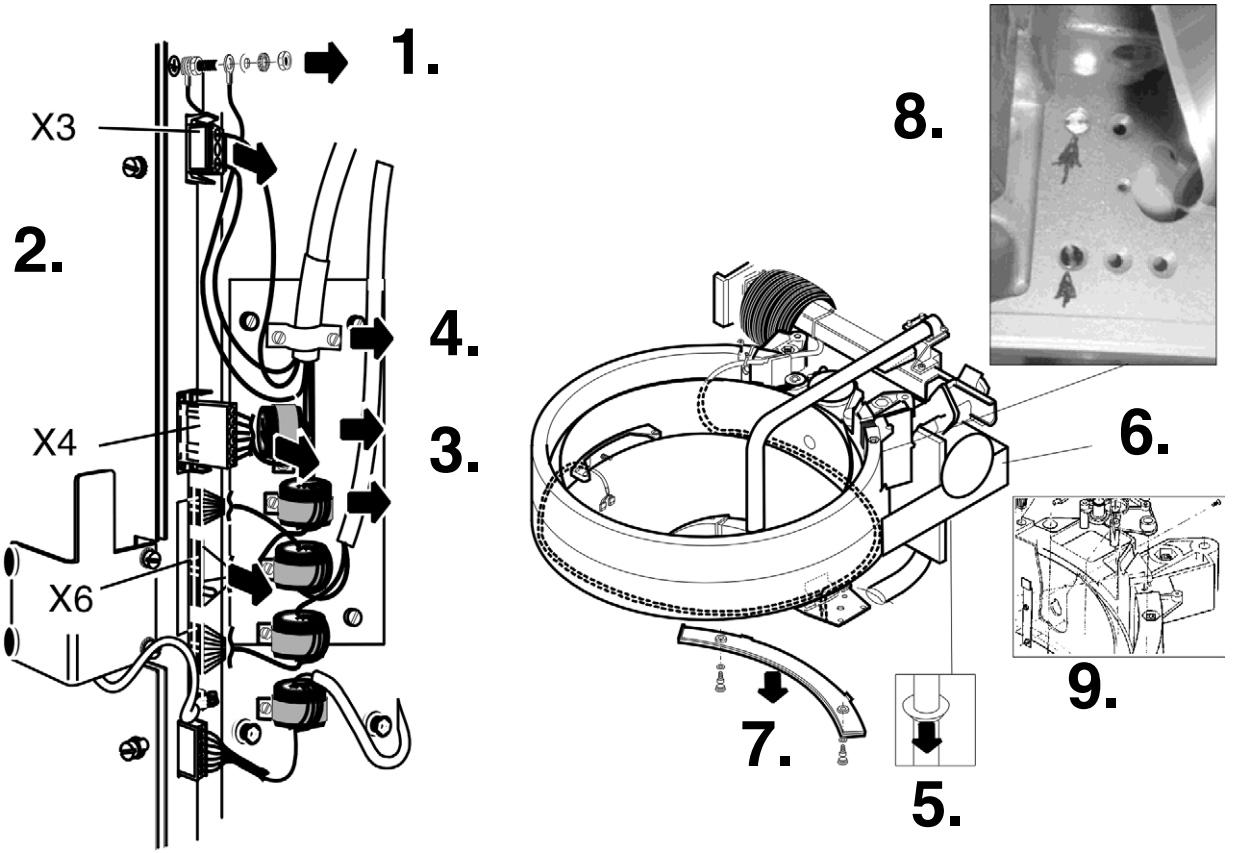
2.4 Pull out rotary knob **B**.

2.5 Insert new rotary knob and push down PCB RHB again.

2.6 Turn in screw **C** and reattach the upper cover using the screws.



6.8 Replacing rotary knob and sensor ejector


1.
X3
2.
4.
X4
3.
X6
8.
6.
9.
7.
5.

- Open the unit.
- **Remove the old ring cable.**
- Column side

1. Unscrew the ground cable (SW 7 mm).

2. Pull the plug connections X3, X4 and X6 off the old ring cable on the unit side.

3. Unscrew the 2 upper annular cores (can be reused) and pull the cables out from the cores.

4. Unscrew the cable clamp (2 screws)

- Ring side

Do NOT unscrew the holder A for the light barrier.

Unscrew the Ceph bracket:

5. Push the sleeve downwards.

6. Remove the lower part of the cover (2 screws).

7. Unscrew the segment **B** (2 caps, 2 screws and washers).

8. Turn the ring until the screw heads are visible. Mark the position of the screw heads.

9. Undo the 2 screws on the Ceph bracket and remove it.

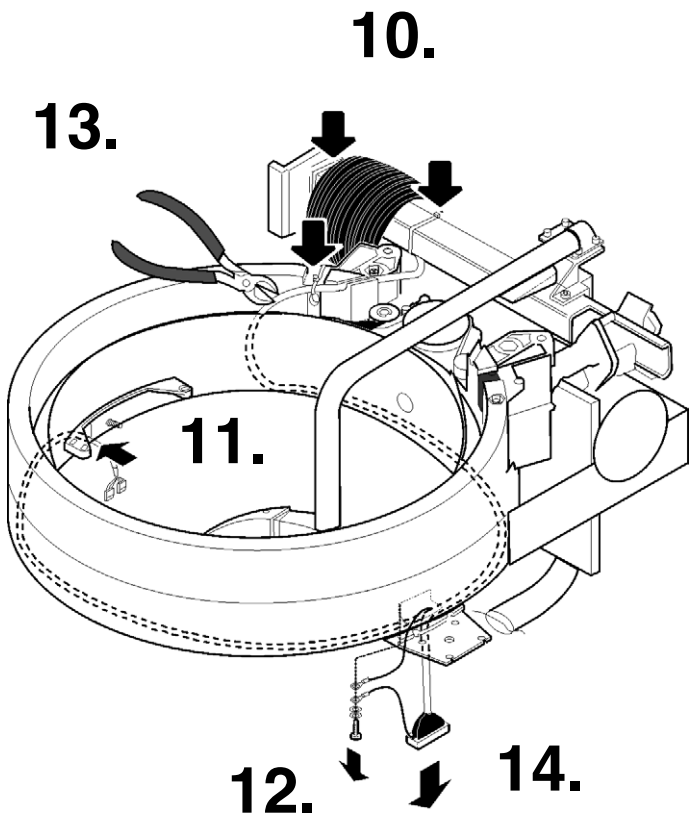
10. Cut the 3 cable ties and remove them. Draw the cable through the bellows.

11. Draw the cable end coming from the film holder through the opening in the ring (X1A, X1B).

12. Pull off plug K9. Loosen the cable clamp. Unscrew the X-ray tube assembly. Unscrew the shielding eye on the connector **K3 and K9** from the ring (2 leads).

13. Cut through the ring cable L4.

14. Draw the connector **K3 and K9** and the ring cable through the opening on the X-ray tube assembly out from the ring (the ring cable is no longer required).



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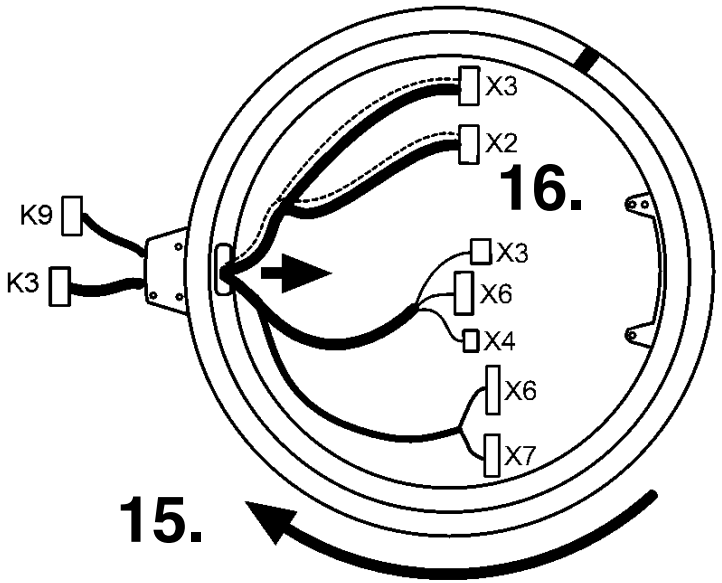
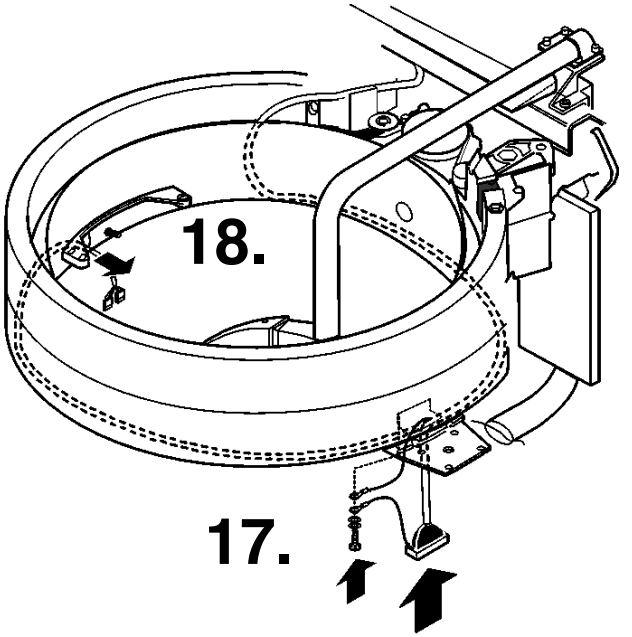
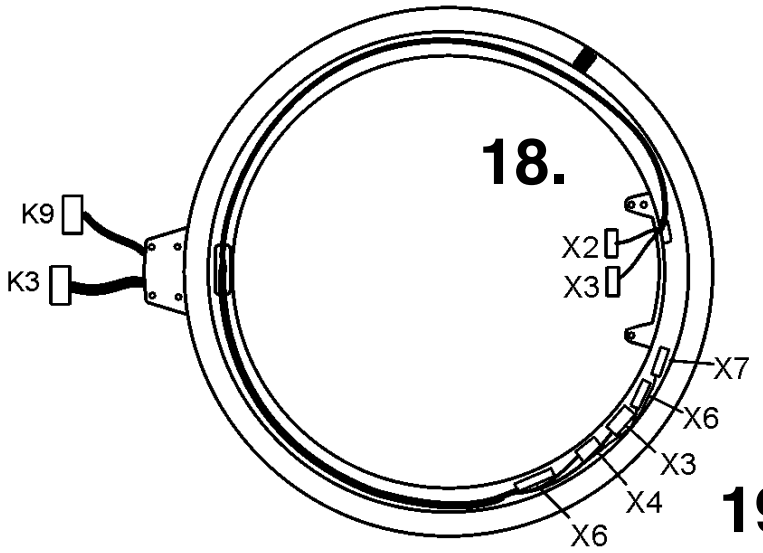
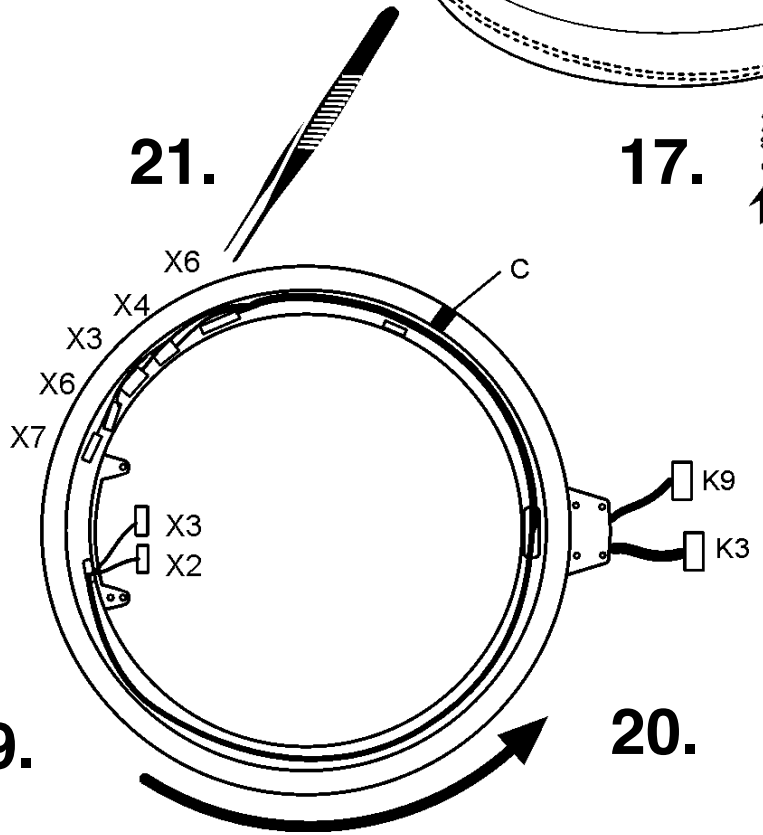
6.9 Replacing ring cable L4


X3
X2
16.
K9
K3
X3
X6
X4
X6
X7
15.


18.
17.


18.
K9
K3
X2
X3
X7
X6
X3
X4
X6
19.


21.
X6
X4
X3
X6
X7
C
X3
X2
K9
K3
20.

Continued from previous page

- **Install the new ring cable**
- Inserting the ring cable into the ring

1. Rotate the X-ray tube assembly mounting bracket into the left position.

15. Draw the new ring cable with the plug connections on the device side through the opening on the X-ray tube assembly to the inside of the ring.
Sequence of the plug connections: X6 (sensor plug), → X7, → X3, → X4,→ X6 (diaphragm signal), → ground wire,→ X2,→ X3.

- Danger of damaging the plug connections on the device side.
- Lay the long cable end over the ring.

16. Align the plug **K3 and K9** for the tube assembly and screw the 2 grounding eyes (black and copper-colored) onto the ring.
Push the plug **K3**, do not pull on the cable!

17. Lay the shielded cable (X2, X3) in the ring and draw the plugs X2, X3 through the opening in the sensor holder, until the hexagonal sleeve projects approx. 20 mm.

18. Insert the main strand of the ring cable into the ring as shown.

19. Rotate the ring carefully to the right and thus guide the ring cable underneath the light barrier **C**.

20. Using tweezers, carefully take the ring cable out of the ring behind the light barrier.

21. Insert the unit side of the ring cable into the recess in the ring and fix it with a cable tie **B** at the mark **A**.
The cable tie on the ring must have approx. 10 mm play.

22. Guide the ring cable through the bellows.

23. Fasten the ring cable with a cable clamp (2 screws).

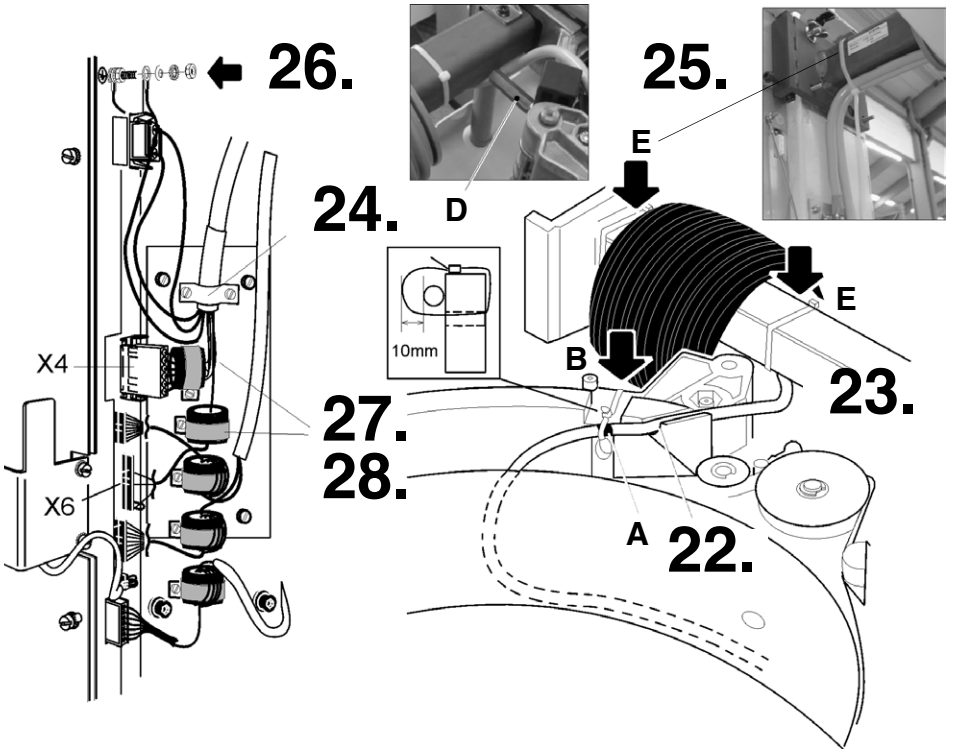
24. Lay the cable behind the bolt **D** and fasten it with 2 cable ties **E** to the ring carrier (green mark beneath cable tie).
The cable must rest firmly against the ring carrier.

25. Screw in the ground wire.

26. Guide the cable (X4) through the ferrite core and screw it in.

27. Draw the cable (X6) through the ferrite core and screw it in.

- Fastening the Ceph bracket.



6.9 Replacing ring cable L4

sirona
The Dental Company

7 Maintenance

Maintenance

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7.2 Checking the forehead support ..... 7 - 7
7.3 Checking the diaphragm wheel ..... 7 - 9
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Measurements

Always switch the unit OFF before connecting the measuring instruments.

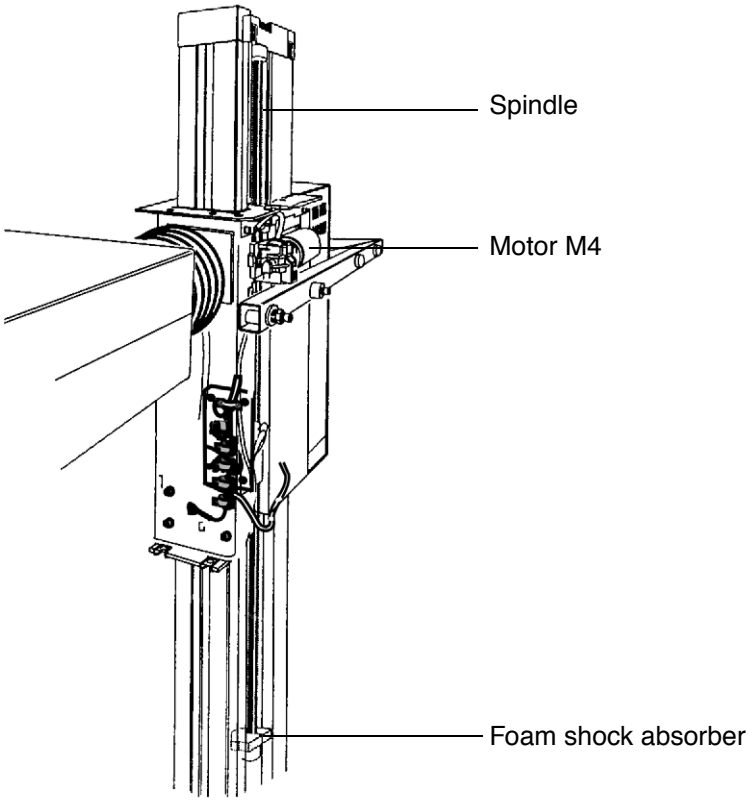
Select the correct current/voltage type and adjust the measuring range to match the expected readings.

Perform continuity tests only on units which are switched off.

If several exposures with radiation must be taken to check a measurement, make sure that the prescribed cool-down intervals are observed.

Observe the radiation protection guidelines before releasing the radiation.

When opening the unit:
Please observe precautionary measures when handling PCBs (ESD).
Make sure you touch a ground point to discharge yourself prior to touching the components.



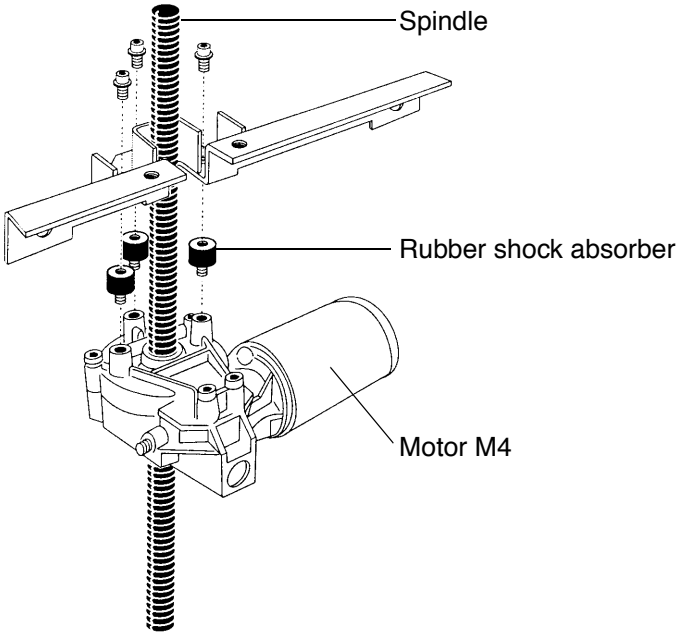


Fig.1: Spindle/Motor M4

Check whether the height adjustment causes atypical running noises:

– Move the unit up and down through its entire adjustment range.

The following running noises may then occur:

– Repetitive, knocking noises which occur depending on the speed of adjustment.
Motor bearing damaged.

☝ See chapter 6.3, Replacing the spindle with motor M4 for height adjustment.

– Loud humming noise.
Rubber shock absorber and/or foam shock absorber brittle. Replace rubber shock absorber and/or foam shock absorber.

– Heavy, hammering bearing noises in the column which influence the synchronism of the unit. Check roller treads for damages and for movability.

☝ See chapter 6.7, Replacing Column Stand.

Check whether the limit switch and the safety limit switch for the height adjustment is functioning reliably:

– Move the unit up and down through its entire height adjustment range:
Limit switches "UP" and "DOWN" must respond.
Actuate safety switch manually, motor must stop.

If limit switches or safety switch do not work, check microswitch and cable L6 and replace them if necessary.

Check whether the acoustic signal can be heard during height adjustment:

If no acoustic signal is audible, replace and adjust PCB DX1.

☝ See chapter 4.10, Adjusting board DX1.

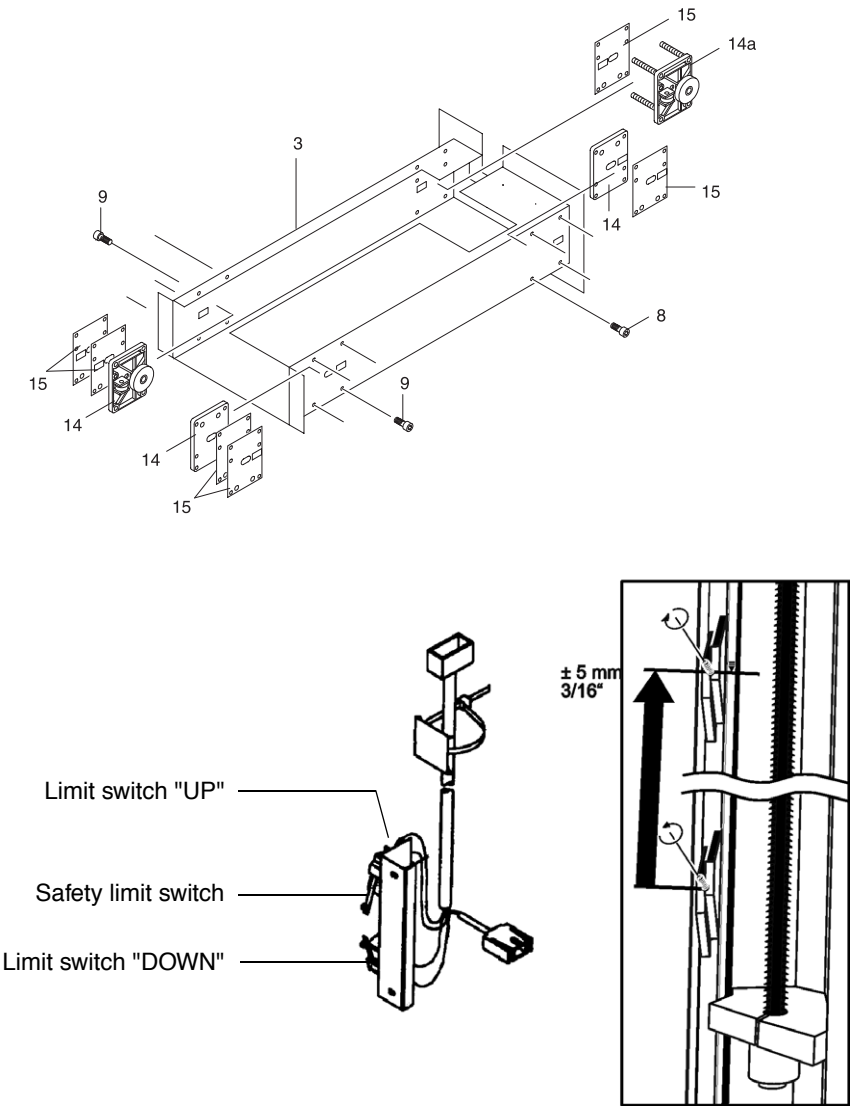


Fig.2: Rollers/Limit switch

7.1 Checking the height adjustment

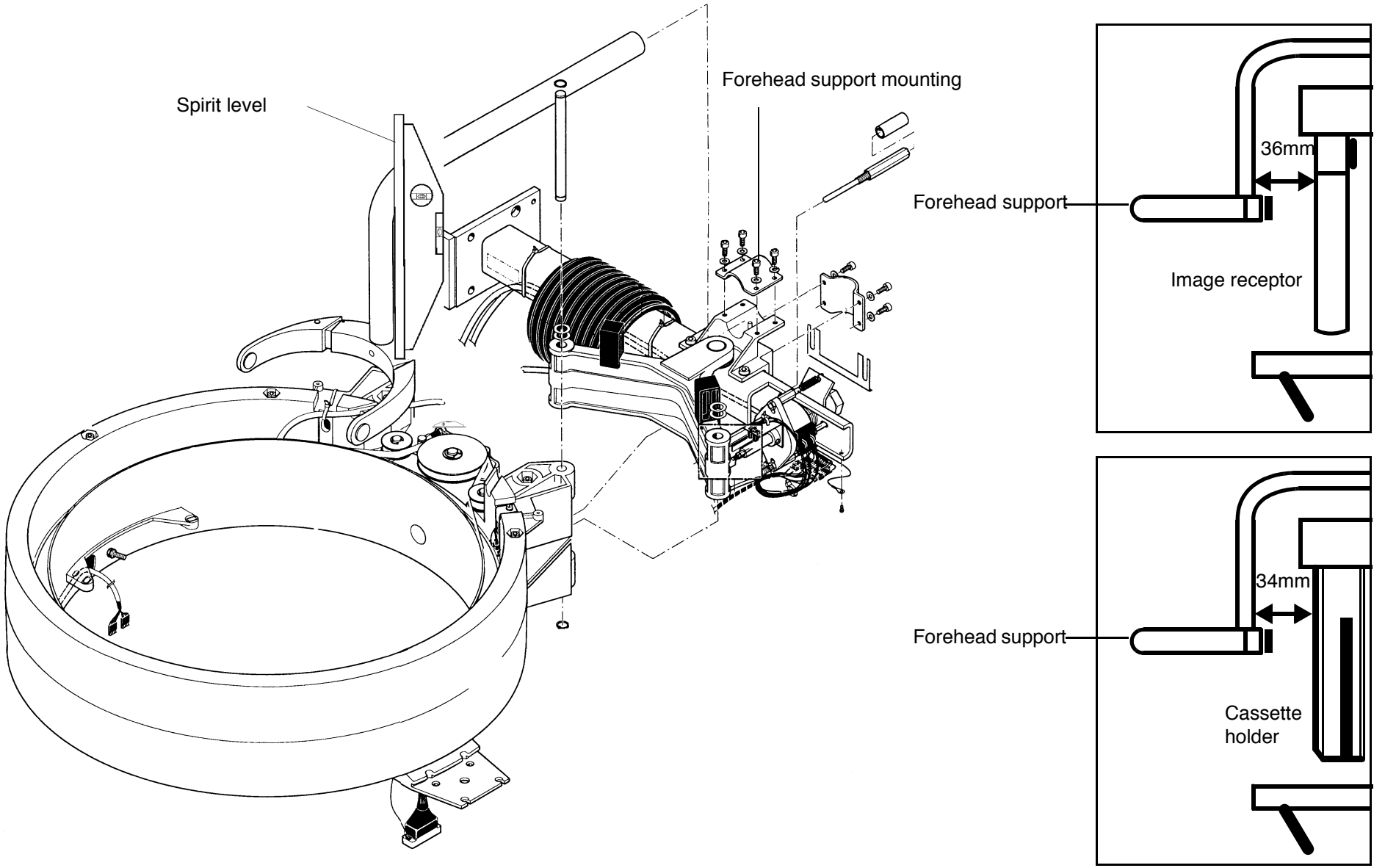


Fig.3: Forehead support

Check the forehead support to make sure that it is mounted vertically:

– Place a spirit level against the tube bend of the forehead support. ☝ See Fig. 3: Forehead support
– Check for a distance of 36mm between the tube bend and the image receptor and of 34mm between the tube bend and the cassette.

  If the forehead support is not mounted vertically or the distance is not correct, adjust the forehead support.

Check whether the temple supports can be adjusted symmetrically:

– Rotate the adjusting knob for the temple supports while observing the position of the temple support arms.

  If the temple supports cannot be adjusted symmetrically, replace forehead support.

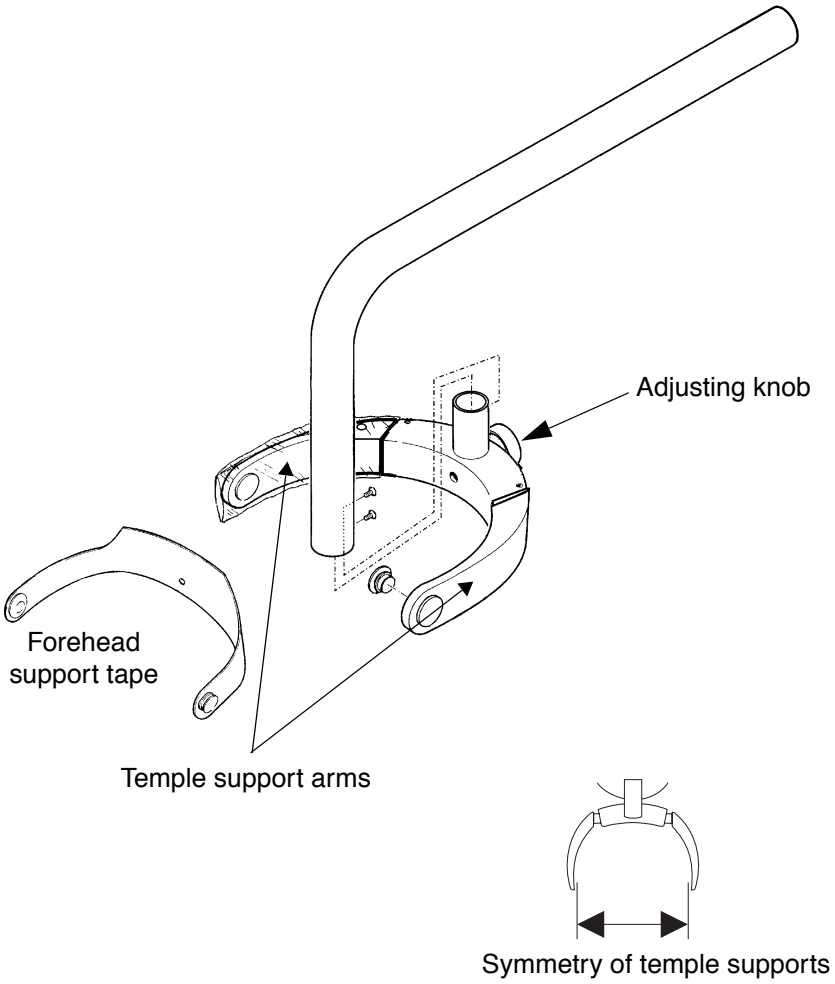
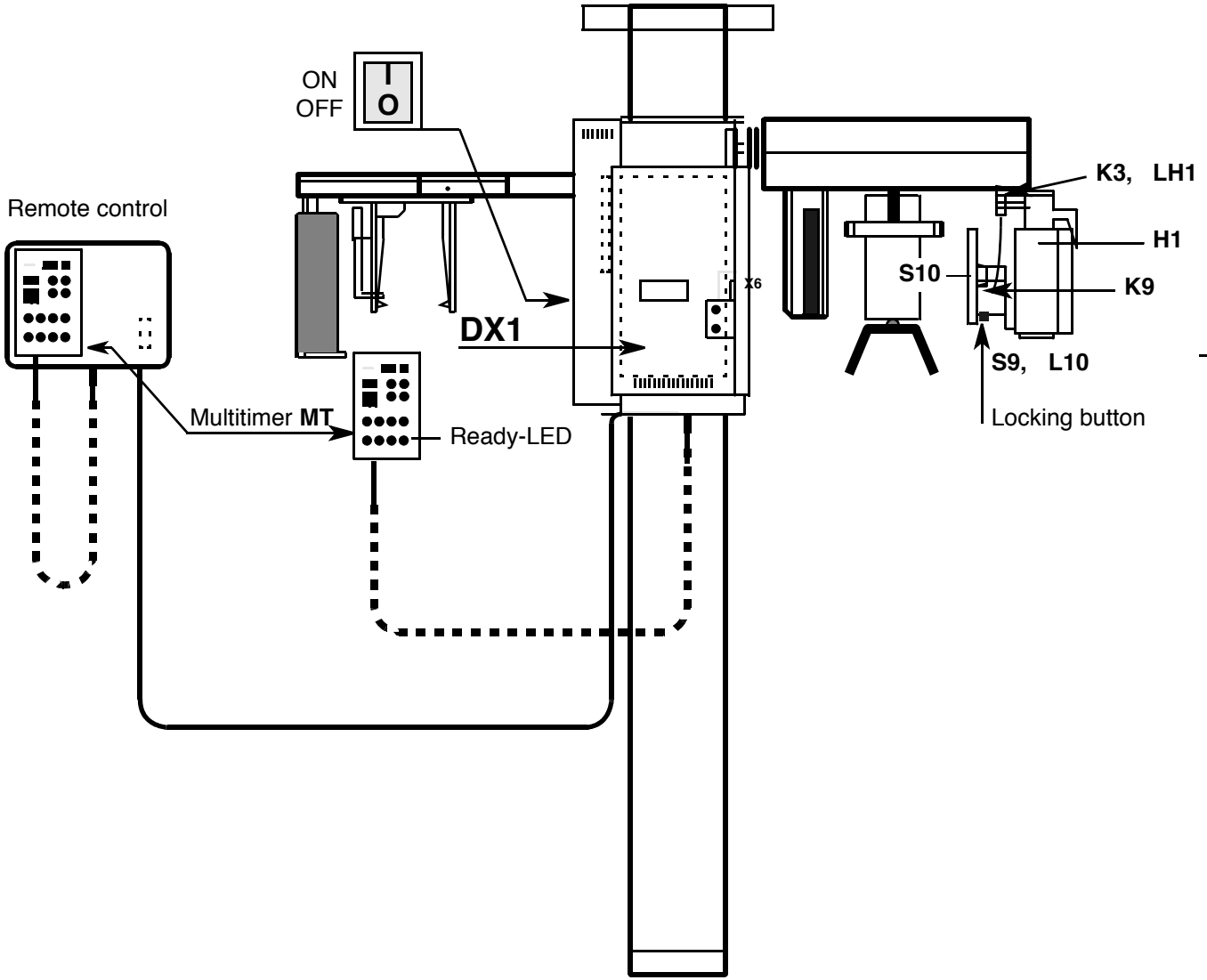
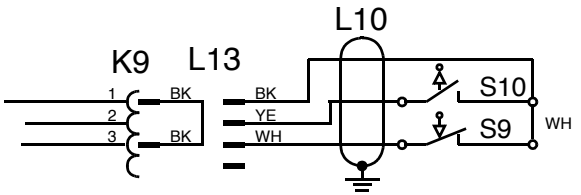


Fig.4: Adjusting the temple supports

7.2 Checking the forehead support





Ceph unit

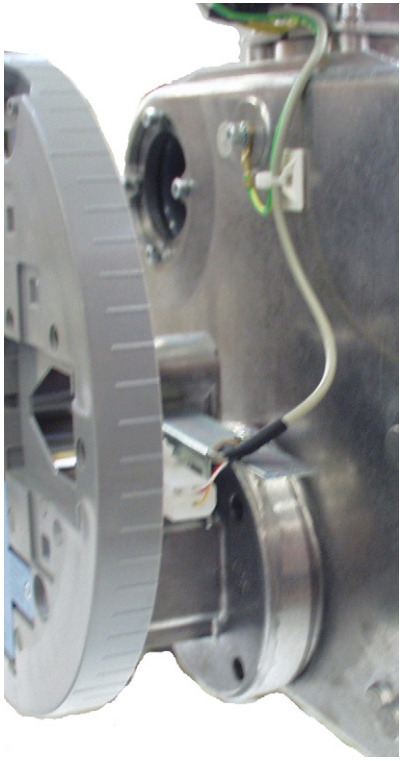


Fig.5: Diaphragm switch

Only on units with cephalometer

Check the diaphragm wheel to make sure that it can be rotated and engages securely:

– Press locking button briefly and turn diaphragm wheel until it engages.

The diaphragm number appears at the top right of the diaphragm window.

☝ See Fig. 6: Diaphragm wheel.

If the diaphragm wheel cannot be turned or does not engage, check it:

☝ See chapter 3.5, Correcting errors of help messages H3 06.

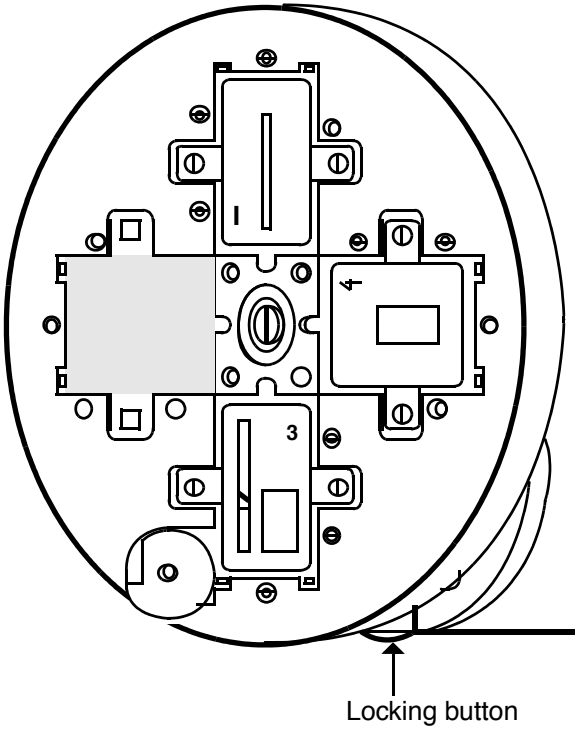
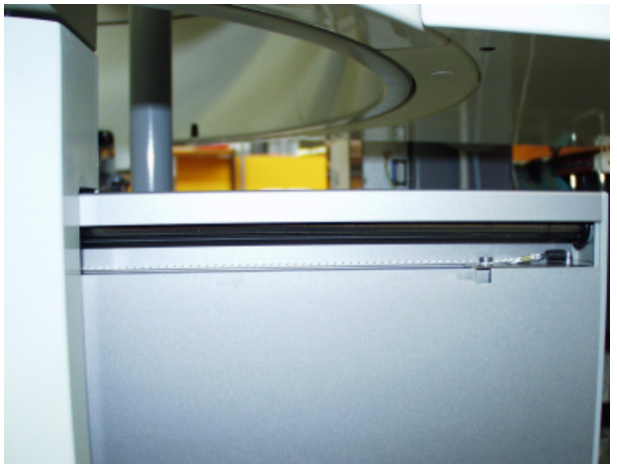


Fig.6: Diaphragm wheel

7.3 Checking the diaphragm wheel



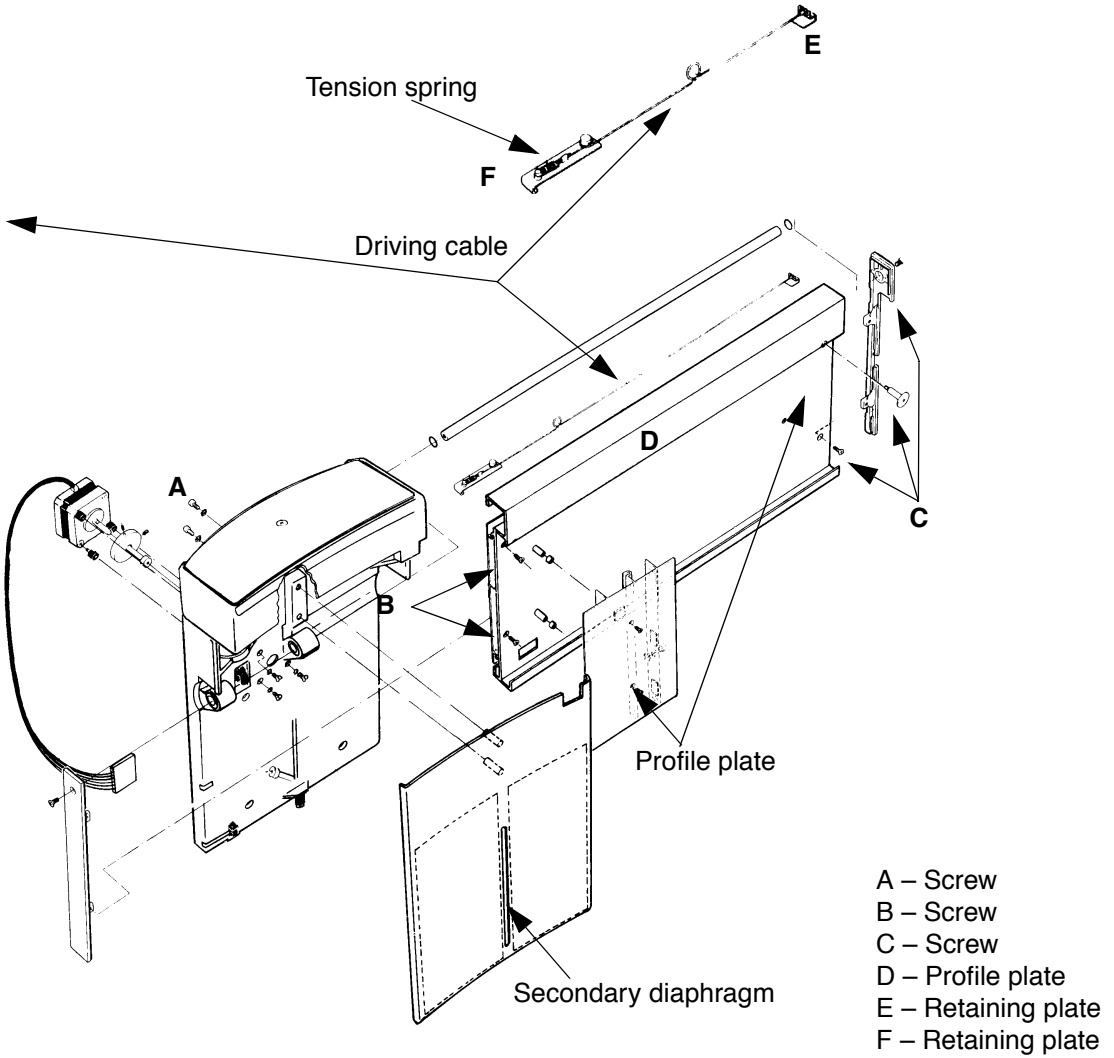


Fig.7: Position of cassette holder driving cable

Check whether the cassette holder engages securely in both end positions:

– Swivel the cassette holder in and out.

☝ See Fig. 8: Cassette holder with swiveling movement.

– Check whether the restoring spring snaps the cassette holder into the end position securely.

If the cassette holder is not locked in place, grease the travel track with “Longtime TD2” and check for mechanical wear and tear. Replace the cassette holder if necessary.

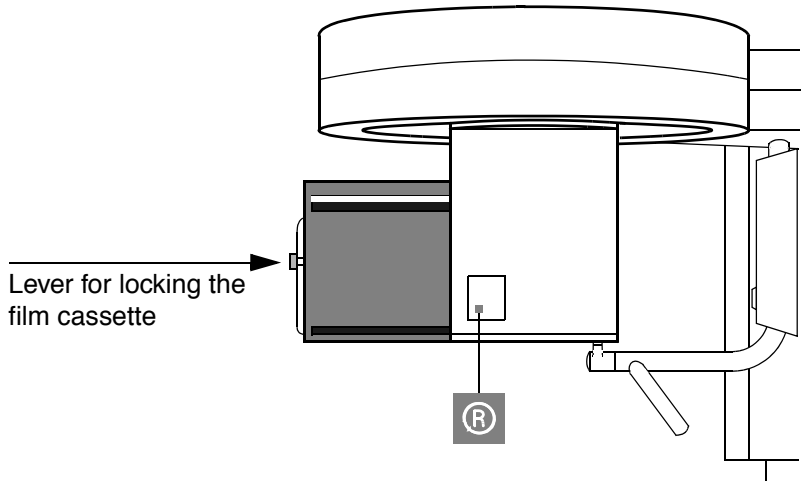
Check the cassette holder driving cable to make sure it is not damaged:

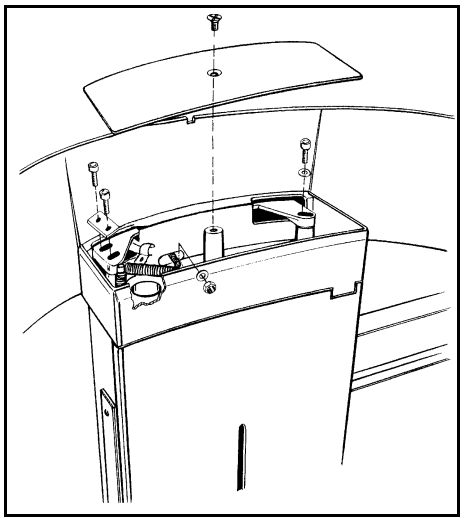
– Perform visual check of driving cable to determine whether it is stretched, spliced or damaged.

☝ See Fig. 7: Position of cassette holder driving cable.

If the driving cable shows any signs of damage, replace it:

☝ See chapter 6.5, Replacing the rope and/or the cassette drive motor M3.





Swiveling movement of cassette holder

Fig.8: Cassette holder with swiveling movement

7.4 Checking the cassette holder

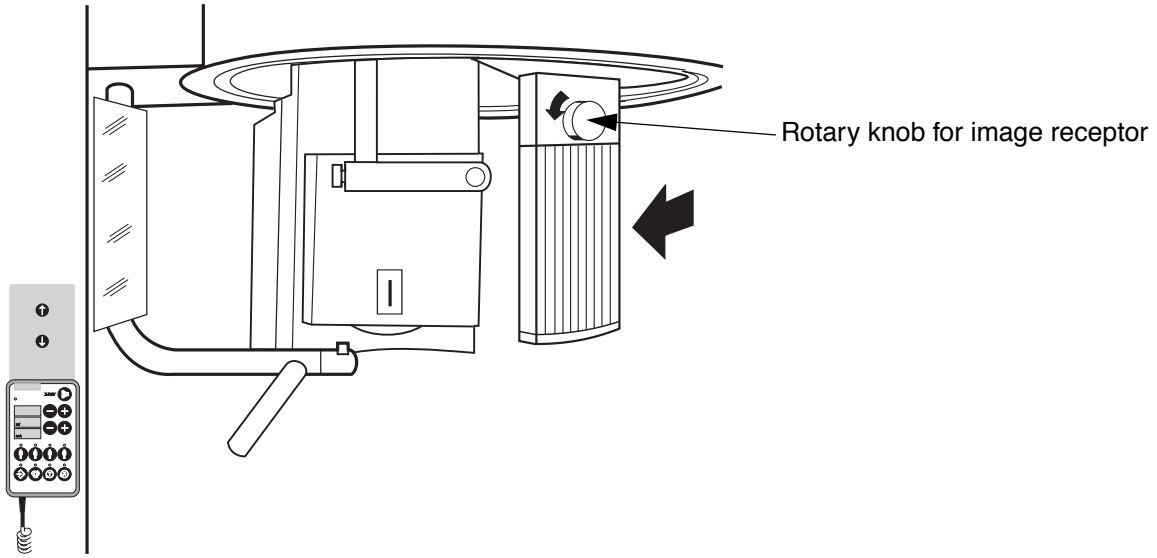


Fig.9: Image receptor with rotary knob

Check whether the image receptor can be screwed in and out easily and fits in the guide snugly:

– Screw the image receptor in and out by turning the rotary knob. Make sure that the image receptor moves easily and without jolting.

☝ See Fig. 10: Rotary knob and sensor ejector.

If the image receptor cannot be screwed in and out easily or fits into the guide too loosely, check whether the teeth on the rotary knob or the sensor ejector are broken. Replace any damaged parts:

☝ See chapter 6.8, Replacing rotary knob and sensor ejector.

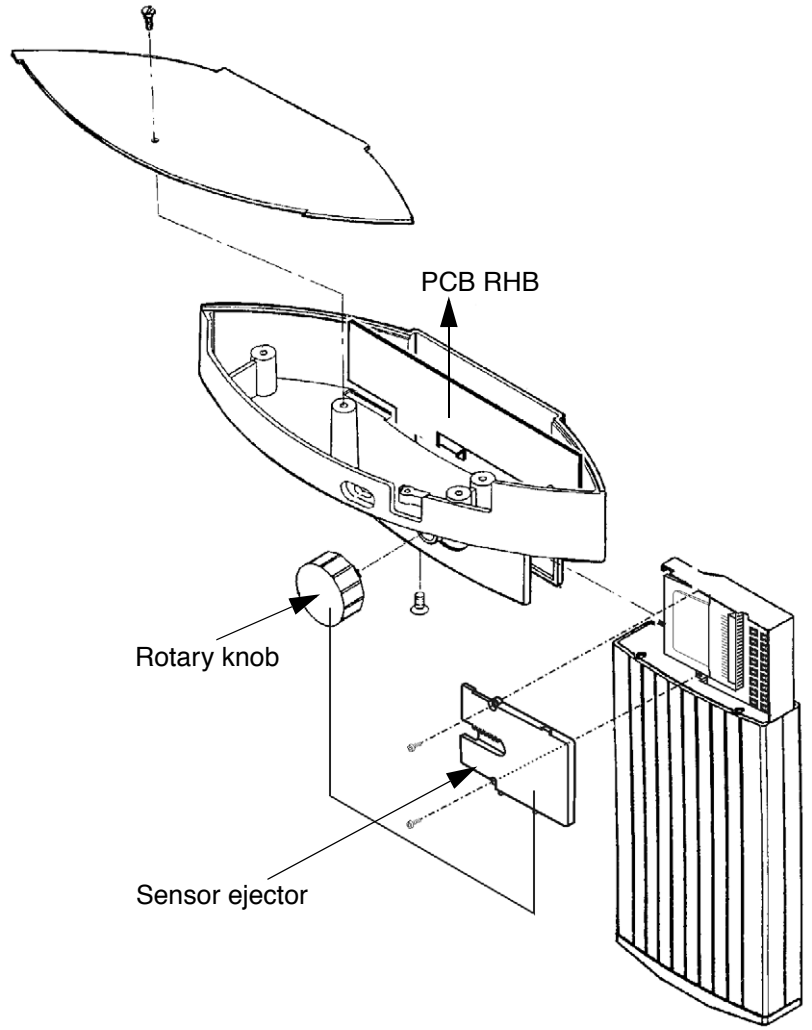
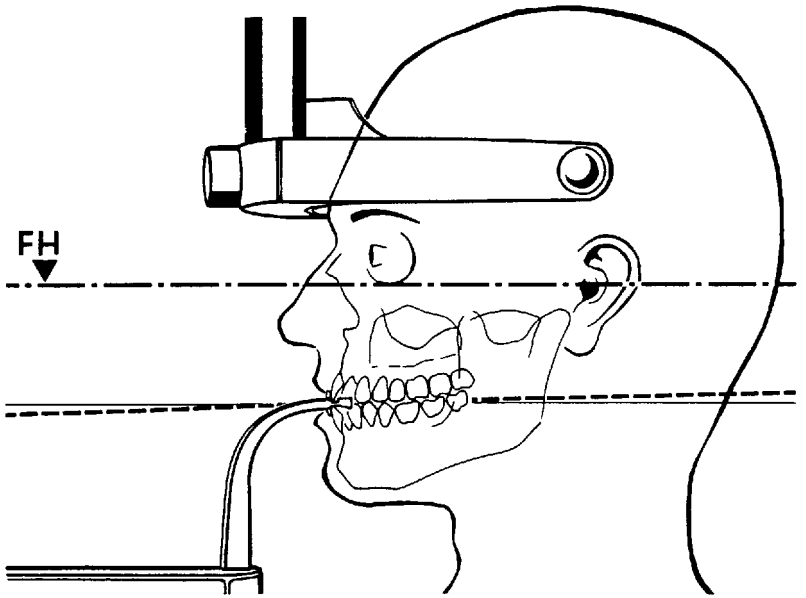


Fig.10: Rotary knob and sensor ejector

7.5 Checking the image receptor



FH – Frankfort horizontal plane

Fig.11: Adjusting the light localizer

Check whether the light localizer can be adjusted:

– Switch on light localizer and adjust its height using slider B.

If the light localizer cannot be moved freely:

- Remove rubbed-off parts
- Polish surface
- Lightly lubricate with vaseline

If the light localizer still won't move freely, replace front cover.

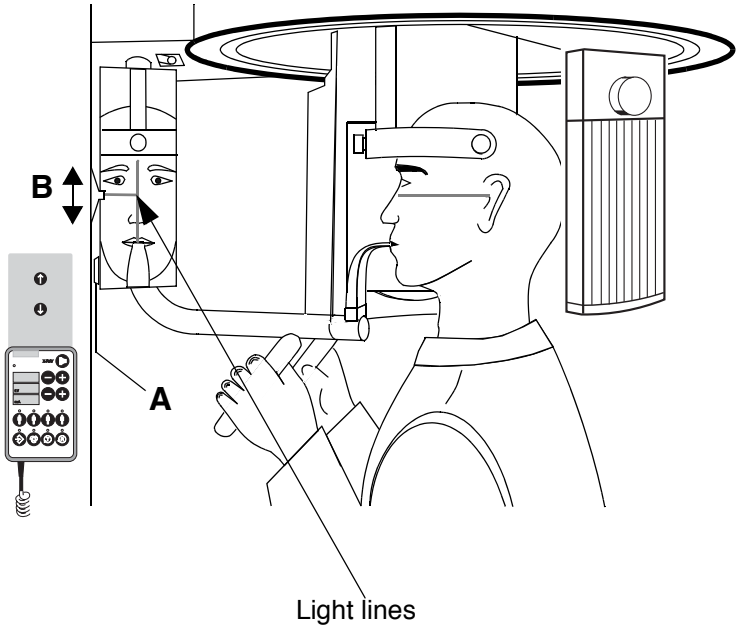


Fig.12: Light localizer with light lines

7.6 Checking the light localizer

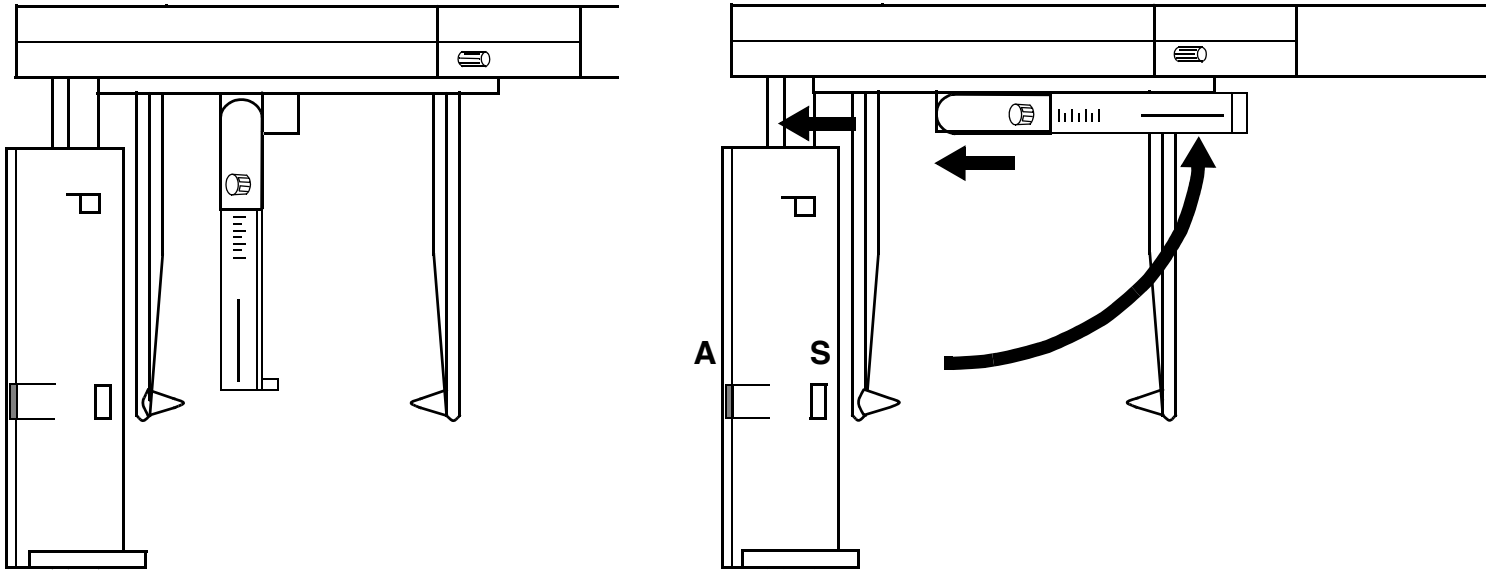


Fig.13: Cephalometer

Check whether the head support can be swiveled:

– Loosen the locking screw. ☝ See Fig. 14: Head support can be swiveled

– Rotate the head support.

The head support must lock in place at 0°.

If the head support cannot be rotated or does not engage properly, check whether it is mechanically obstructed. Eliminate any mechanical obstacle and set the cephalometer, adjust the locking screw mechanically:

☝ See chapter 4.5, Checking and adjusting the ear olives.

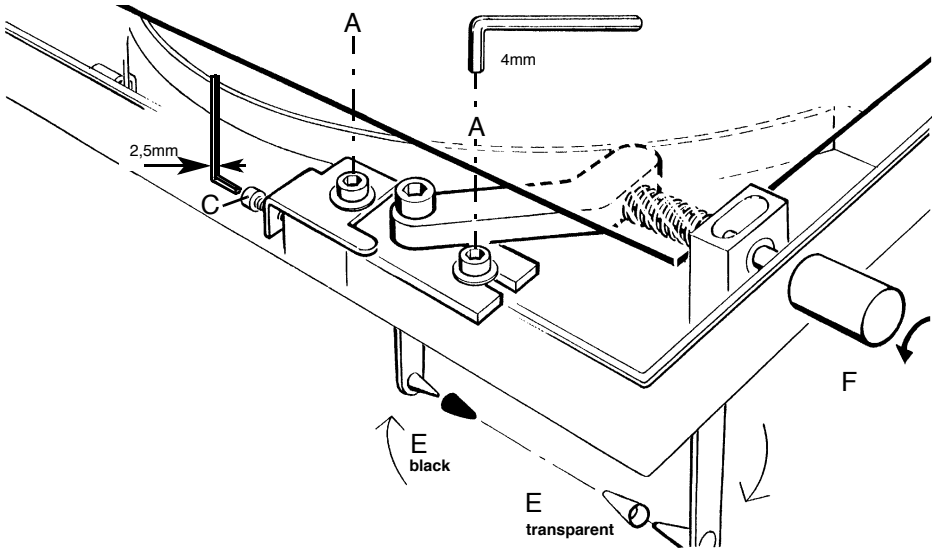


Fig.14: Head support can be swiveled

7.7 Checking the conventional cephalometer

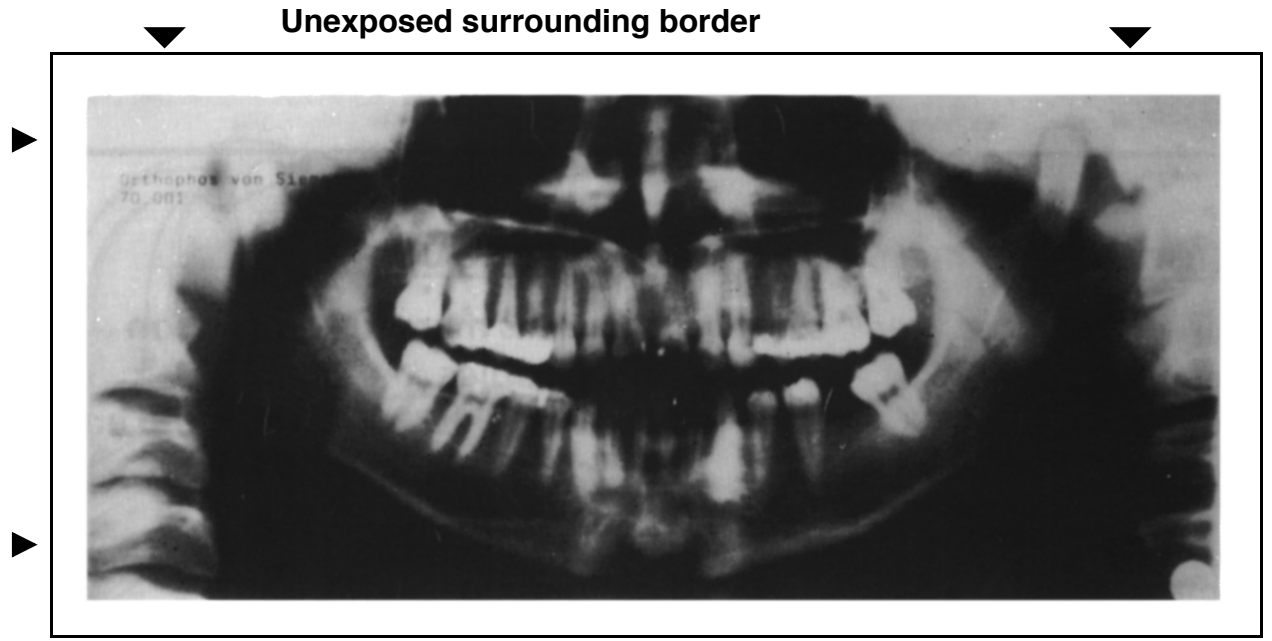


Fig.15: Checking an exposure taken by the dentist

Check whether existing exposures taken by the dentist are OK:

– Check existing exposures taken by the dentist for unexposed surrounding borders. ☝ See Fig. 15: Checking an exposure taken by the dentist.

– Check whether the exposures show normal definition.

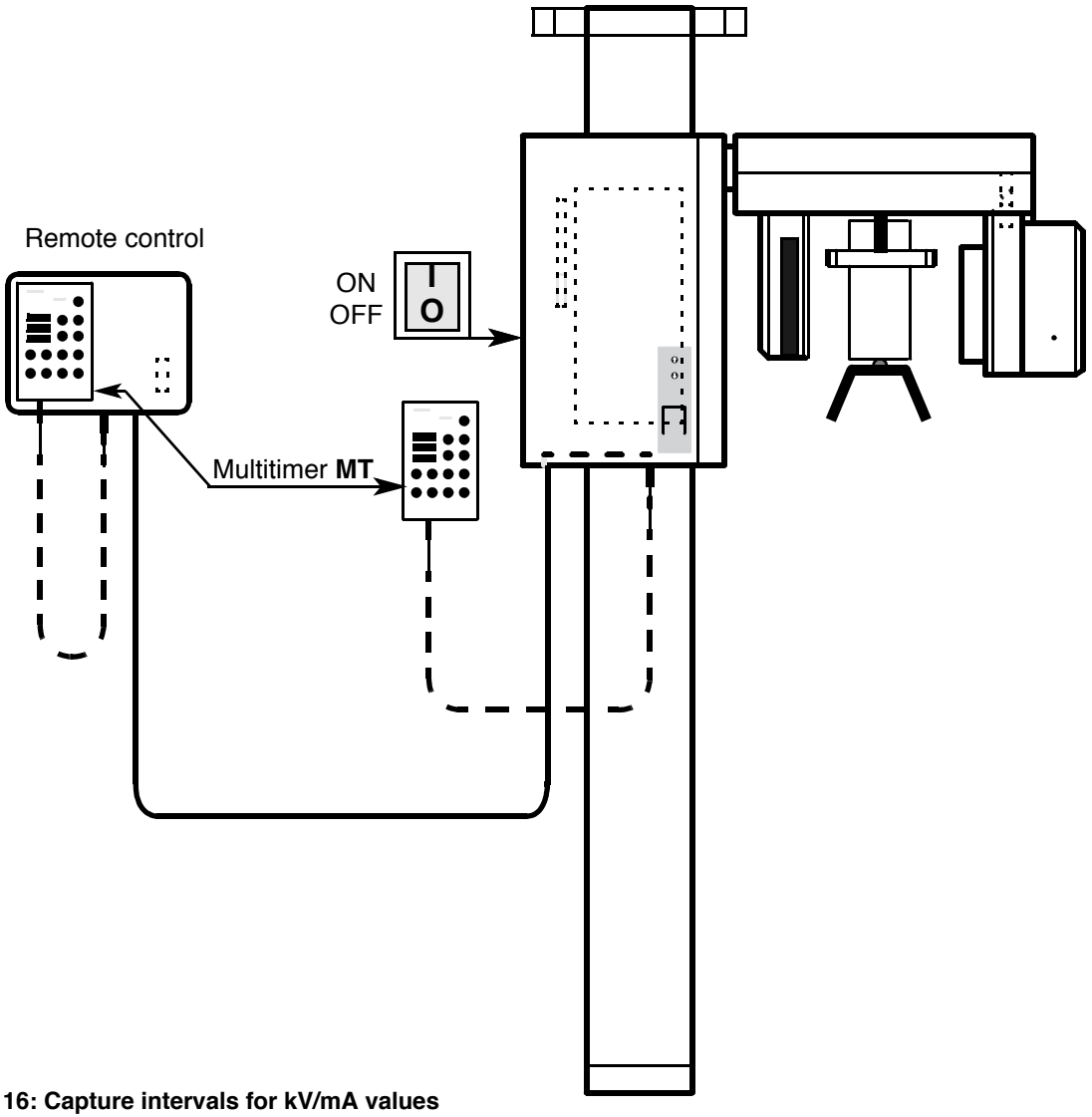
– Check whether the density of the X-ray image is OK.

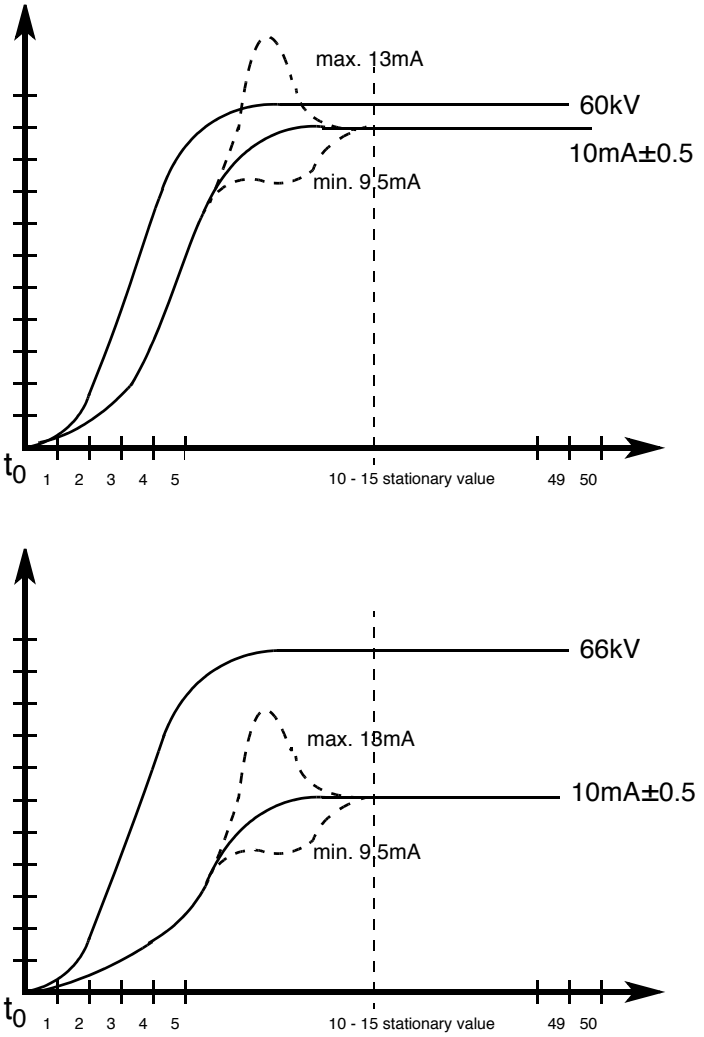
If the quality of the exposure is unsatisfactory in any way, compare the selected exposure settings with the ones specified in the Operating Instructions and check the diaphragm if necessary:

☝ See chapter 7.10, Phantom/needle phantom exposure with ORTHOPHOS 3/3 Ceph.

☝ See chapter 7.11, Phantom/needle phantom exposure with ORTHOPHOS 3 DS/3 Ceph with Upgrade Kit

7.8 Checking X-ray exposures





50 values are measured in intervals of 2 ms.
The measured values can be plotted as points to check the transient characteristics

Fig. 16: Capture intervals for kV/mA values

Check whether the actual kV/mA values and the preheating are correct:

– Select service routine S.04 and check the actual kV/mA values.

If the actual kV/mA values and/or the preheating are not within tolerance, readjust the kV/mA values and the preheating:

☝ See chapter 5.7, Service routine S.05 Heating adjustment.

7.9 Checking the actual kV/mA values and the preheating

Fig.17: Needle phantom exposure and phantom exposure

Check whether the phantom exposure is OK:

ATTENTION

Radiation will be released.
Observe the radiation protection guidelines.

Use the same type of film as is used by the operator in the practice!

– Take a phantom exposure.

The density stripes produced on the film by the phantom must be parallel. No recognizable peaks should occur.

If the phantom exposure is not correct, check the X-ray beam adjustment:

☝ See chapter 4.2, Checking and adjusting the X-ray beam for Panorama radiography.

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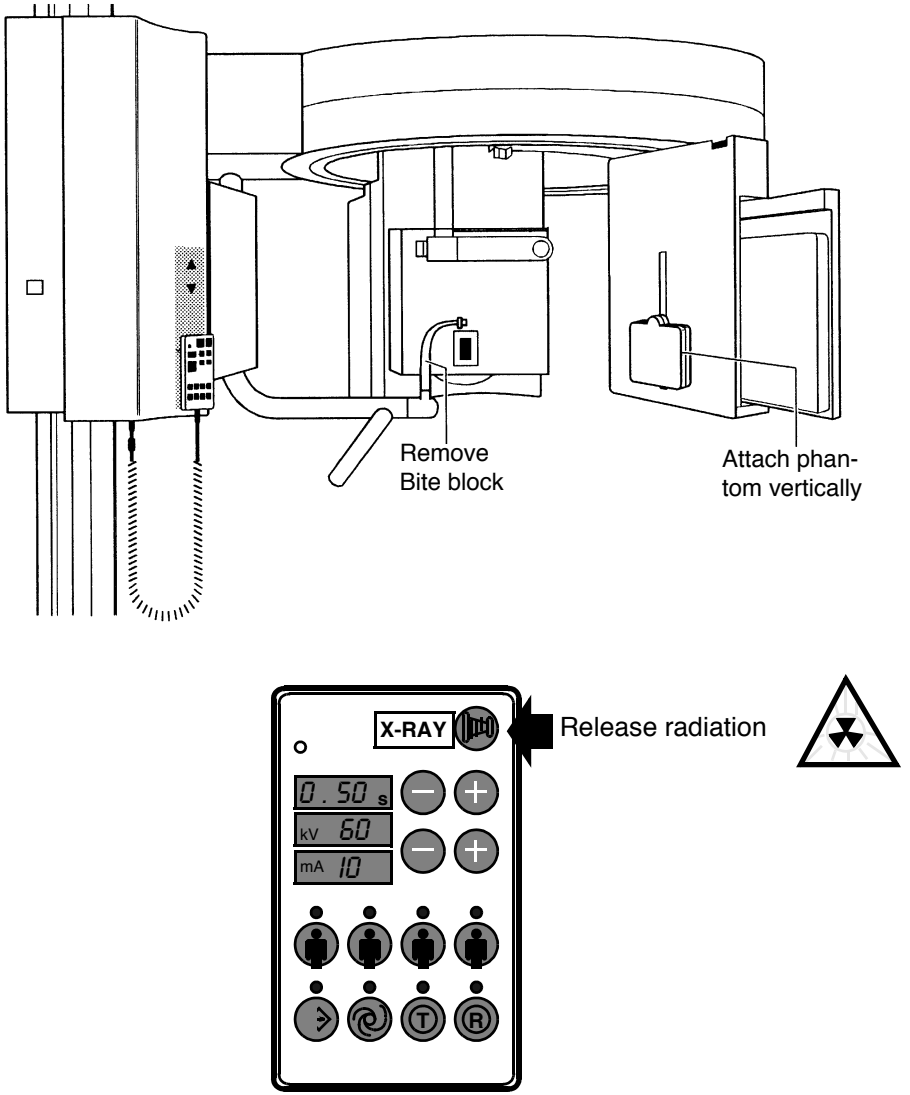


Fig.18: Phantom exposure

7.10 Phantom/needle phantom exposure with ORTHOPHOS 3/3 Ceph

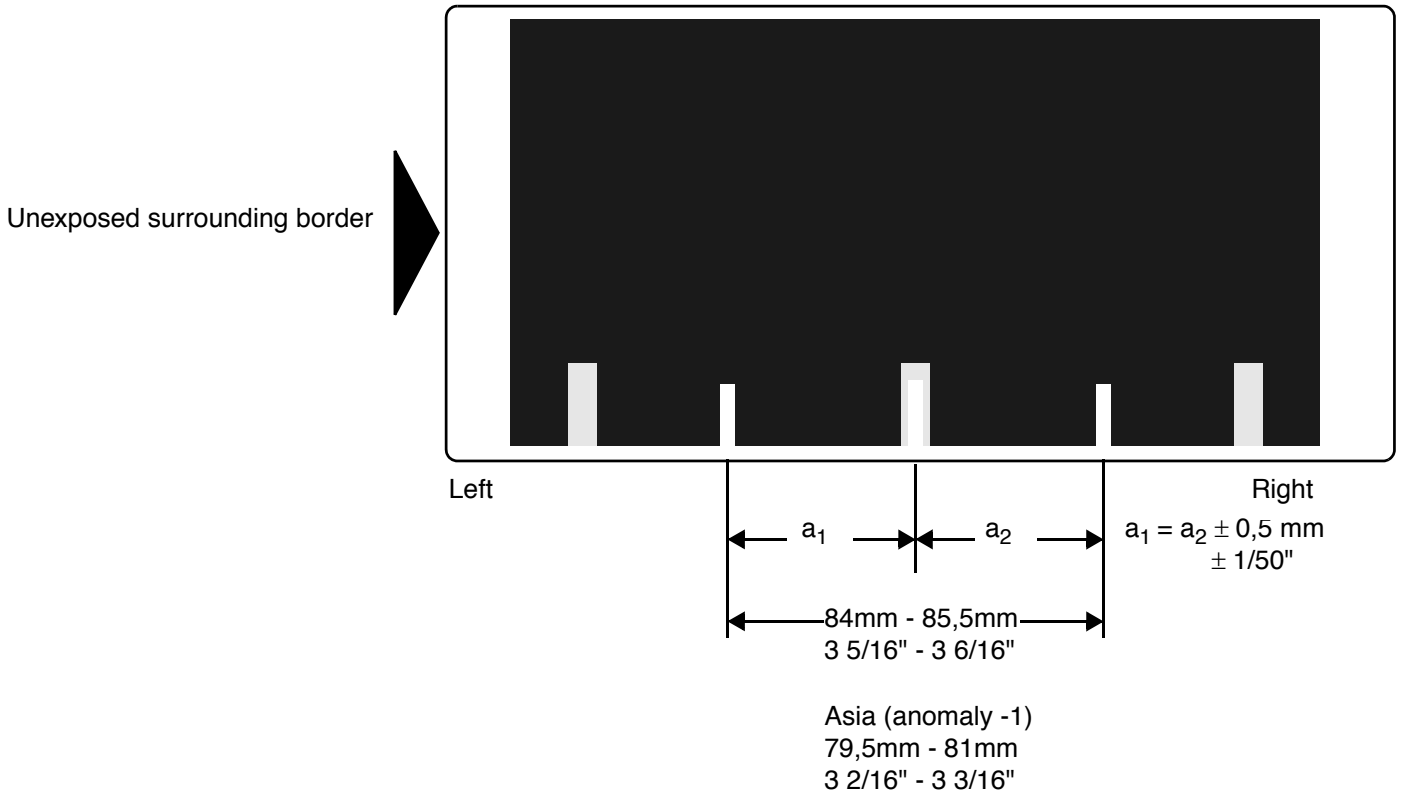


Fig.19: Needle phantom exposure

Continued from previous page

Check whether the needle phantom exposure is OK:

ATTENTION
Radiation will be released.
Observe the radiation protection guidelines.

Use the same type of film as is used by the operator in the practice!

– Take a needle phantom exposure and compare it with the exposure made during installation.
– Measure needle distances, film length and surrounding border.

If the needle phantom exposure is not correct, adjust actuator M2:

☝ See chapter 4.1, Phantom radiograph — Adjusting actuator M2.

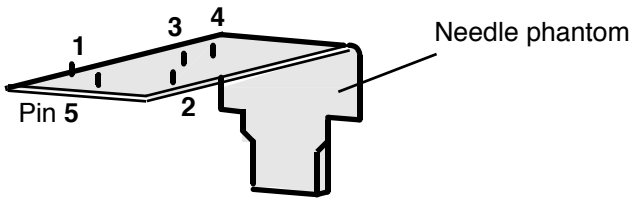


Fig.20: Needle phantom

7.10 Phantom/needle phantom exposure with ORTHOPHOS 3/3 Ceph

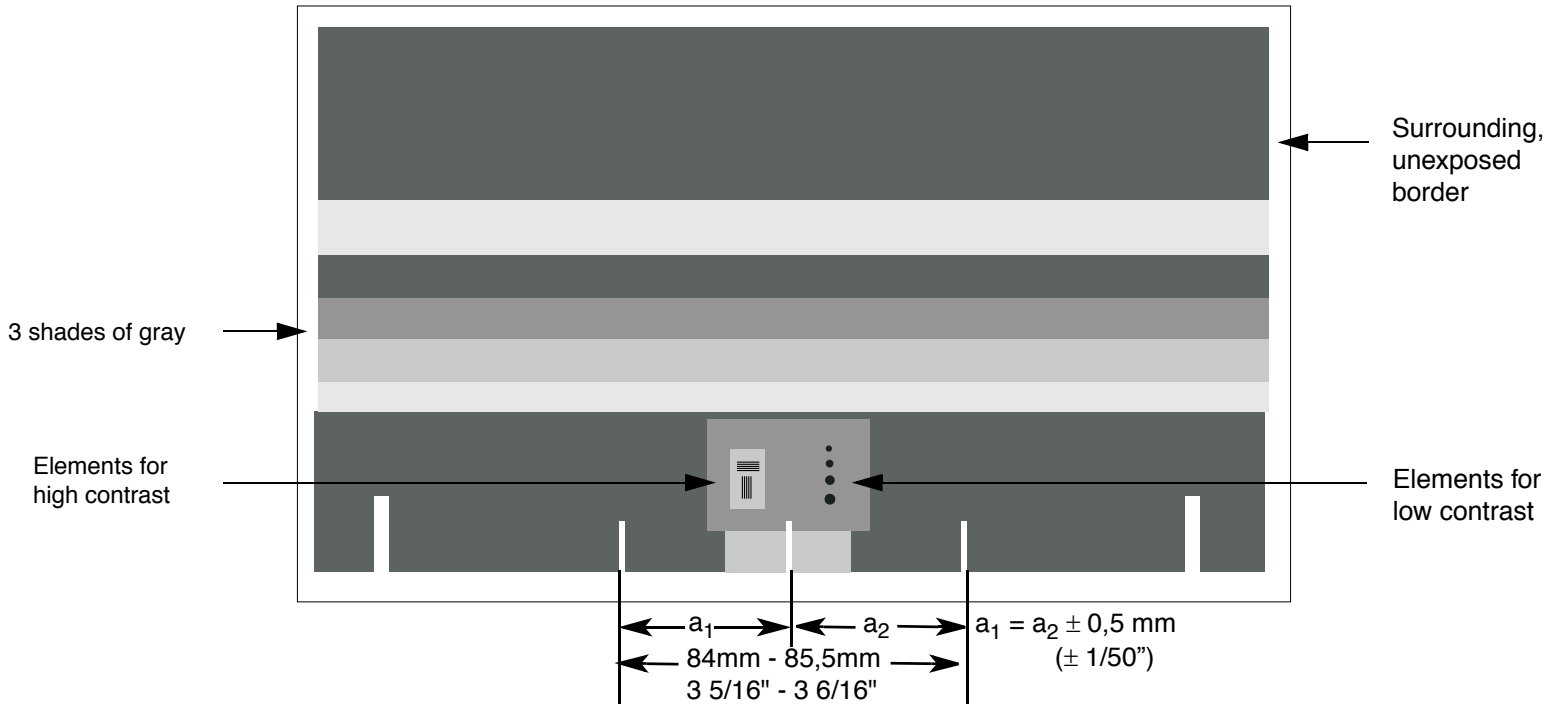


Fig.21: Needle phantom exposure, phantom exposure

Check whether the phantom/needle phantom exposure is OK:

ATTENTION

Radiation will be released.
Observe the radiation protection guidelines.

– Make SIDEXIS ready for an exposure and take an exposure:

1. Select diaphragm position 10.
2. Remove bite block/contact segment.
3. Insert exposure phantom into bite block holder.
4. Insert contrast element **A** with hole into plug-in plate of exposure phantom.
5. Mount phantom with clamp on sensor.
6. Move unit into starting position.
7. Release exposure.

– Compare the exposure just taken with a control exposure.

If the phantom/needle phantom exposure is not correct, adjust the X-ray beam:

☝ See Chapter 4.1 - Phantom radiograph — Adjusting actuator M2

☝ See Chapter 4.2 - Checking and adjusting the X-ray beam for Panorama radiography.

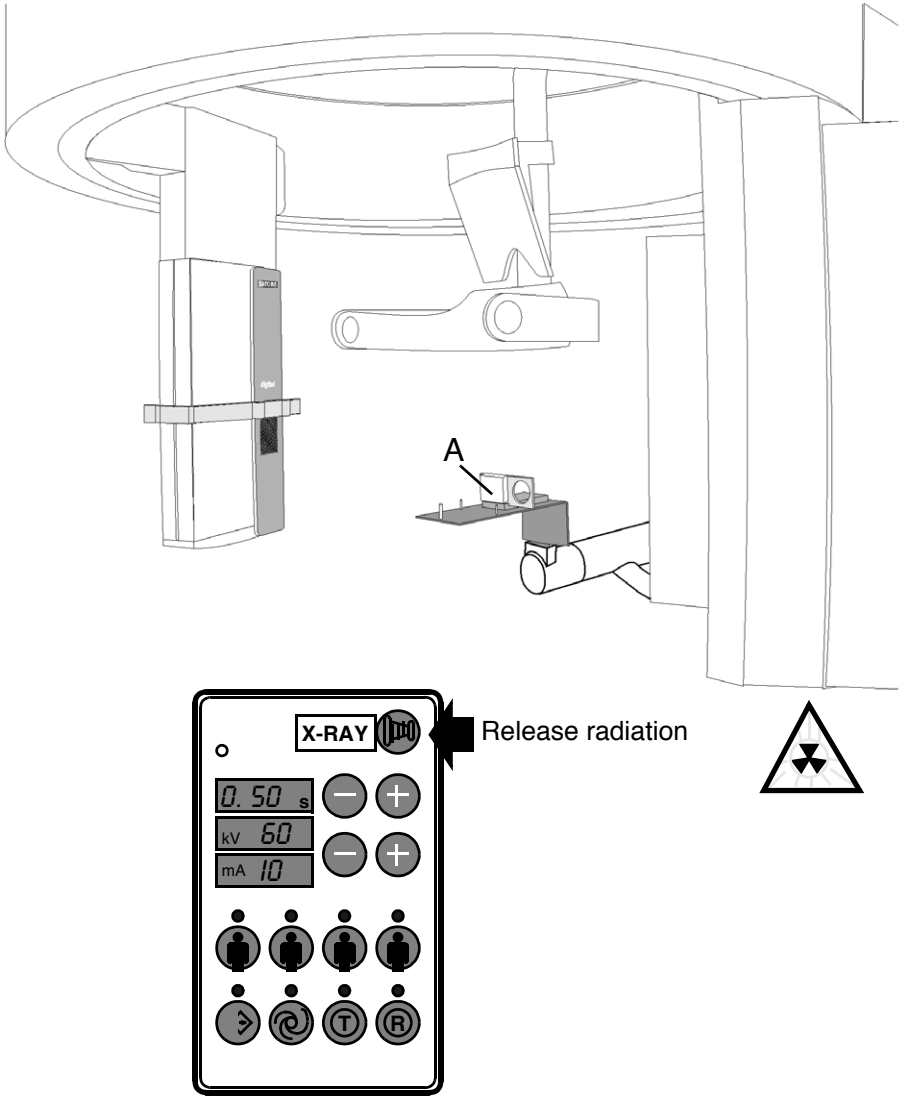


Fig.22: Phantom / needle phantom exposure

7.11 Phantom/needle phantom exposure with ORTHOPHOS 3 DS/3 Ceph with Upgrade Kit

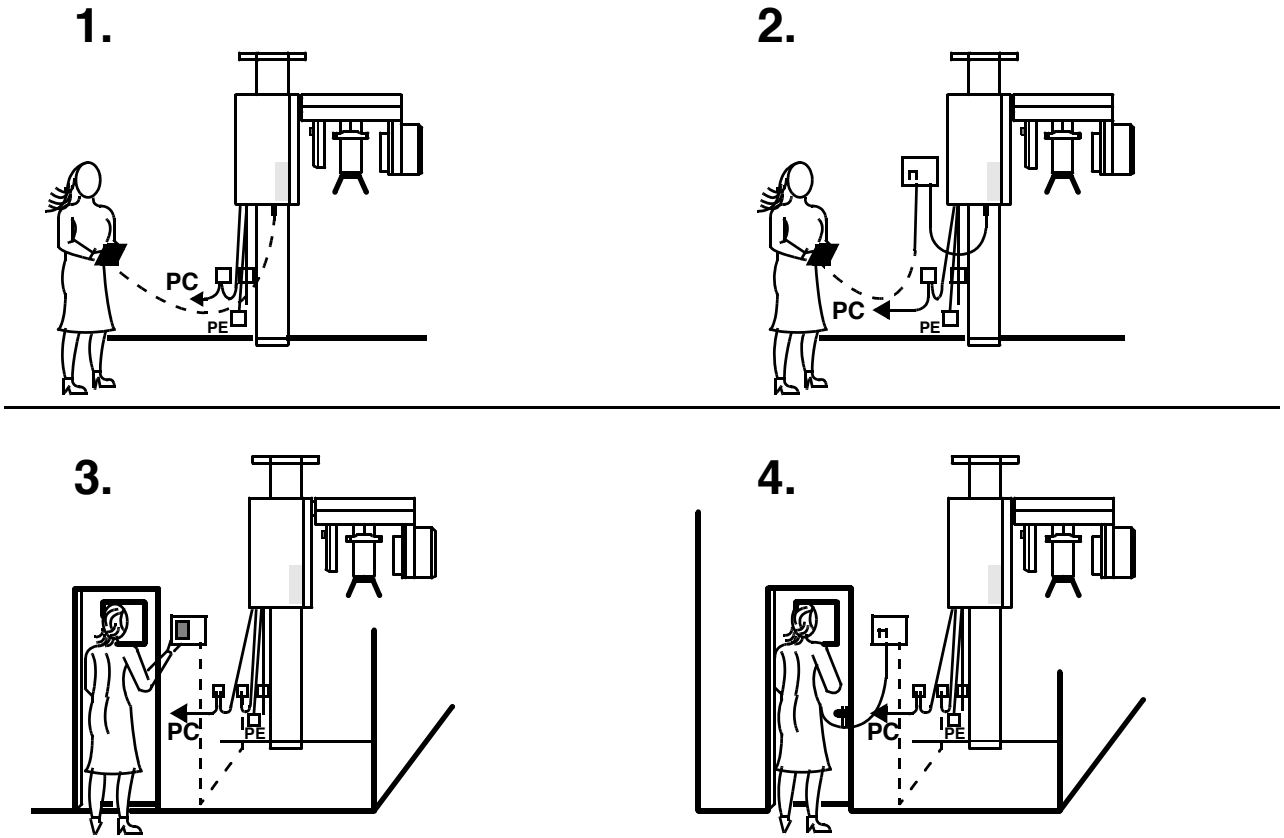


Fig.23: Possible cable routings

Check whether the routing of the cables to the unit is OK:

– Check power cable, protective ground wire, control cables and data transfer cables.

– Perform a visual check to make sure that the cables show no external signs of damage.

  If a cable is externally damaged, replace it.

7.12 Checking cables for damage

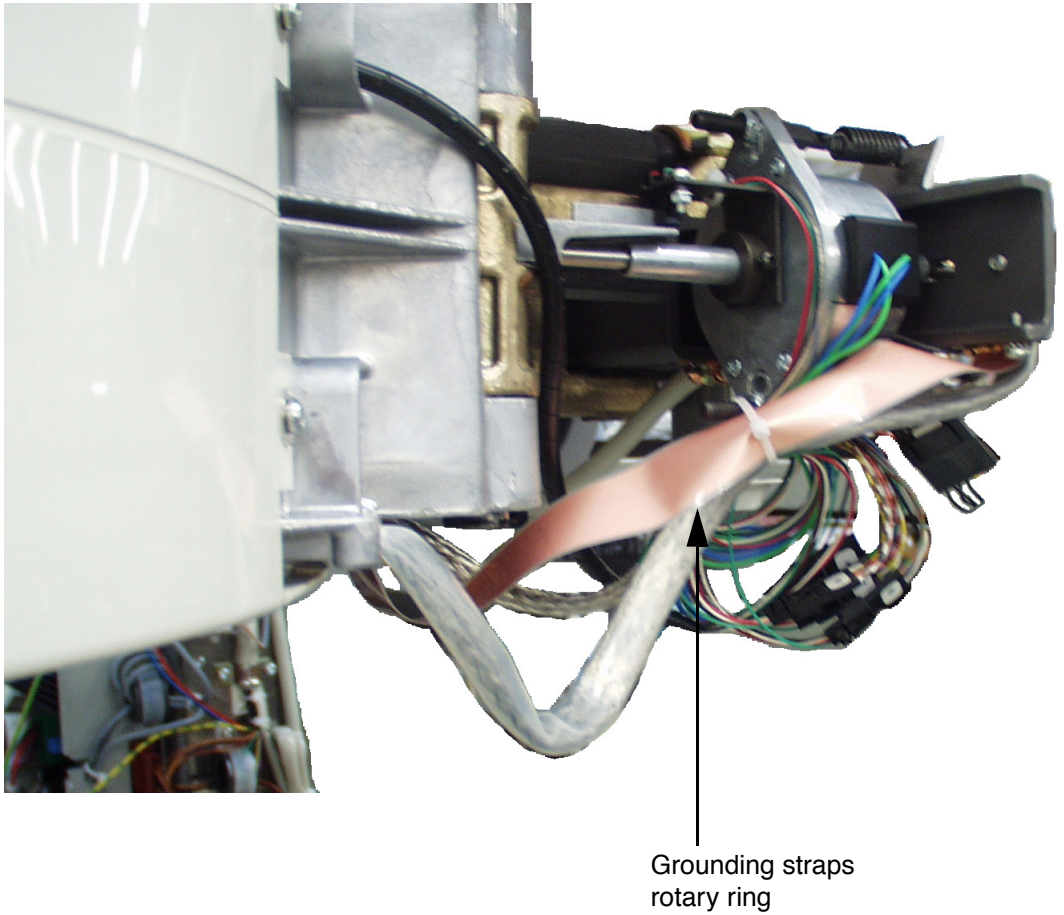


Fig.24: Position of grounding straps

Check whether the grounding straps have complete and firm contact at the positions marked:

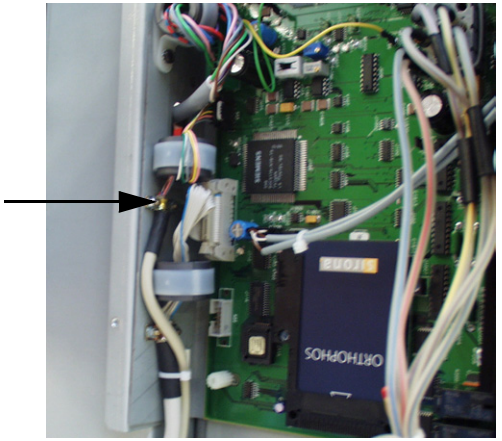
– Check the grounding straps visually and by touching them with your hands.

☝ See Fig. 24: Position of grounding straps.

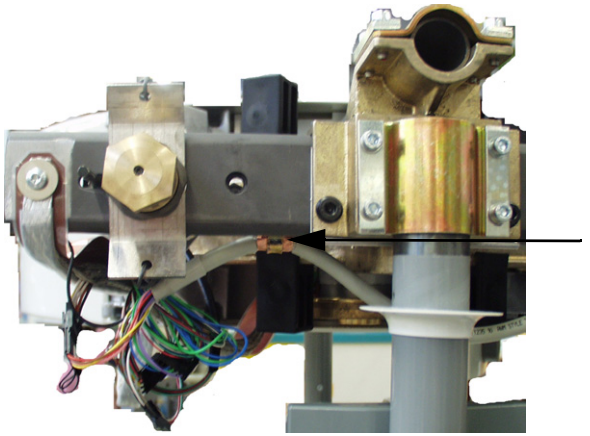
If the grounding straps do not have complete and firm contact, fasten them properly.

If the grounding straps are damaged, replace them.

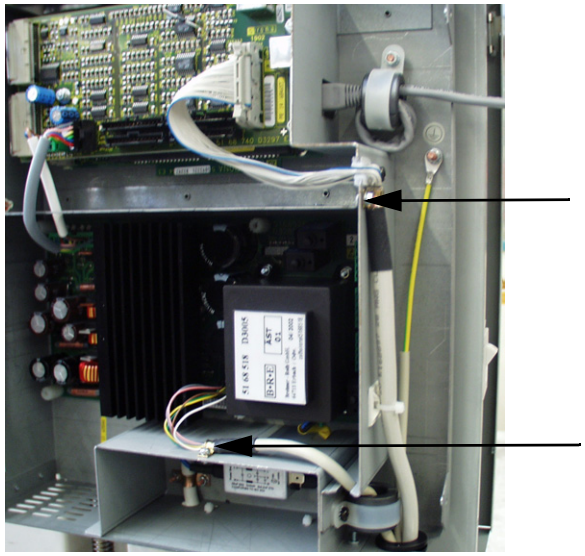
7.13 Checking the grounding straps



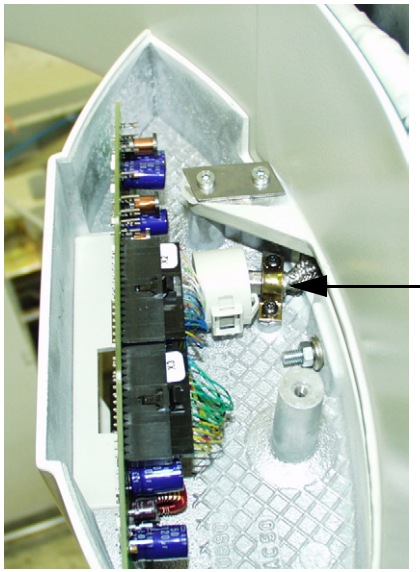
DX1



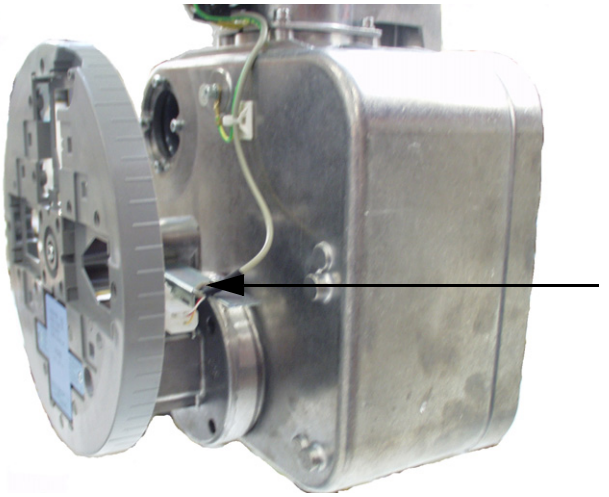
Ring cable



Extension Box



RHB-Board



X-ray tube assembly

Fig.25: Position of shielding

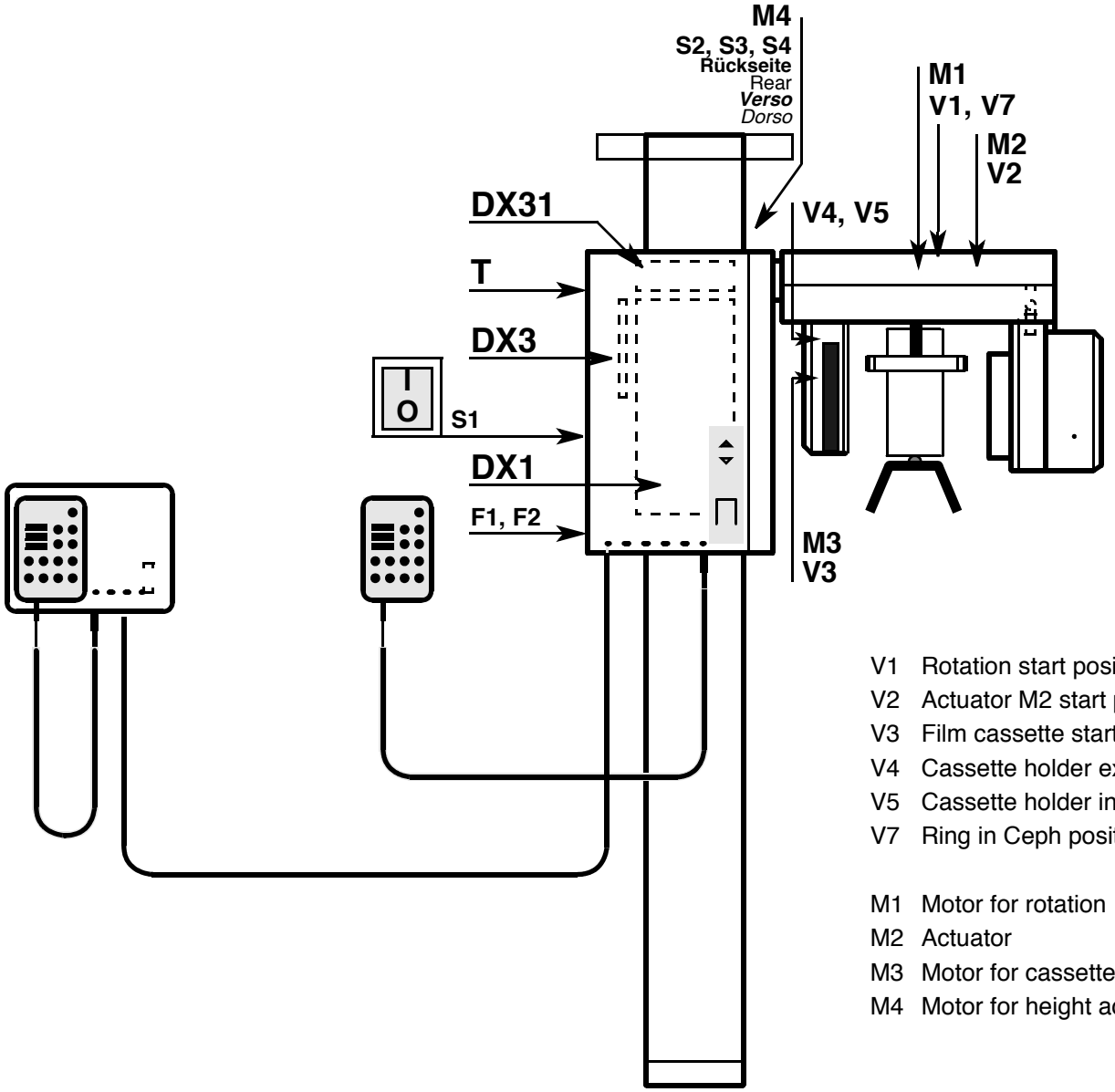
Check whether the shielding of the cables has firm contact:

– Check the cable shielding visually and manually at the positions marked above.

☝ See Fig. 25: Position of shielding.

If the shielding does not have firm contact with the cables, fasten the shielding properly.

7.14 Checking the shielding of the cables



V1 Rotation start position
V2 Actuator M2 start position
V3 Film cassette start position
V4 Cassette holder exposure position
V5 Cassette holder in Ceph position
V7 Ring in Ceph position

M1 Motor for rotation
M2 Actuator
M3 Motor for cassette movement
M4 Motor for height adjustment

Fig.26: Position of light barriers V1 – V7

Check whether light barrier housings V2 to V8 are free of damage and properly secured:

– Remove the ring cover.

– Perform a general check of light barriers for mechanical obstruction by pinched litz wires etc. and eliminate problem if necessary:

☝ See Fig. 26: Position of light barriers V1 – V7.

– Perform a visual check of light barriers for damage or wear and tear, e.g. scuff marks or cracks.

– Check light barriers for firm fastening with your hands.

If individual light barriers are damaged, replace them.

Check whether the ring cable shows signs of external damage or wear and tear:

– Check visually while turning the rotary ring through its entire adjustment range by hand.

If the ring cable does not properly snuggle into the shaft of the ring as a loop, replace the ring cable:

☝ See Fig. 27: Position of ring cable L4

☝ See chapter 6.9, Replacing ring cable L4.

If the insulation of the ring cable is seriously damaged, replace the ring cable:

☝ See chapter 6.9, Replacing ring cable L4.

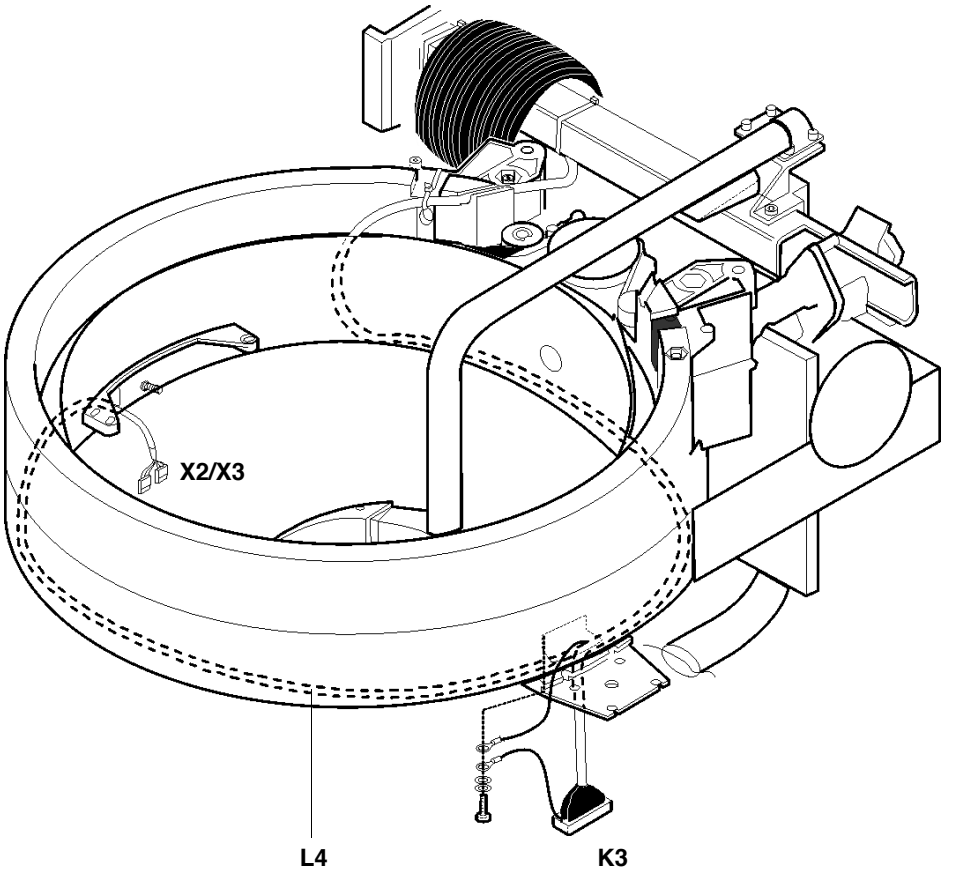


Fig.27: Position of ring cable L4

7.15 Checking light barrier housings V1 to V7/ring cable

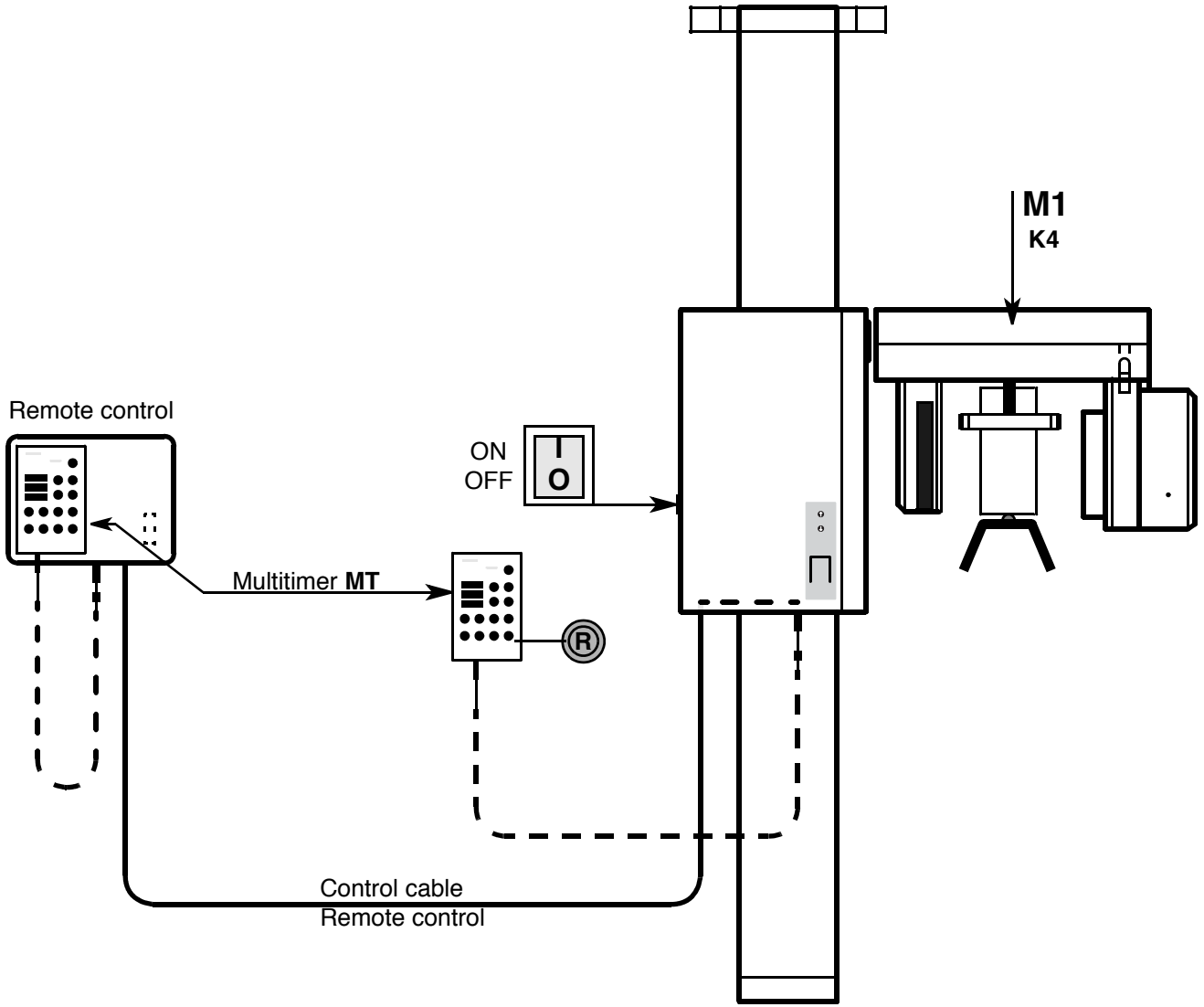


Fig.28: Rotation motor M1

Check whether the prestress of the flat belt on rotation motor M1 is sufficient:

– Trigger rotation while holding the X-ray tube assembly in place. The motor must jam.

If the motor does not jam and the flat belt slips, adjust the flat belt:

☝ See Chapter 6.1 - Replacing the rotation motor M1.

Check whether the counterbalancing disk on rotation motor M1 is properly attached:

– Check with your hands.

If the counterbalancing disk is not properly attached, tighten it with the setscrews.

First screw the counterbalancing disk tight with the first setscrew; then secure it with the second setscrew.

☝ See Fig. 29: Tension of flat belt.

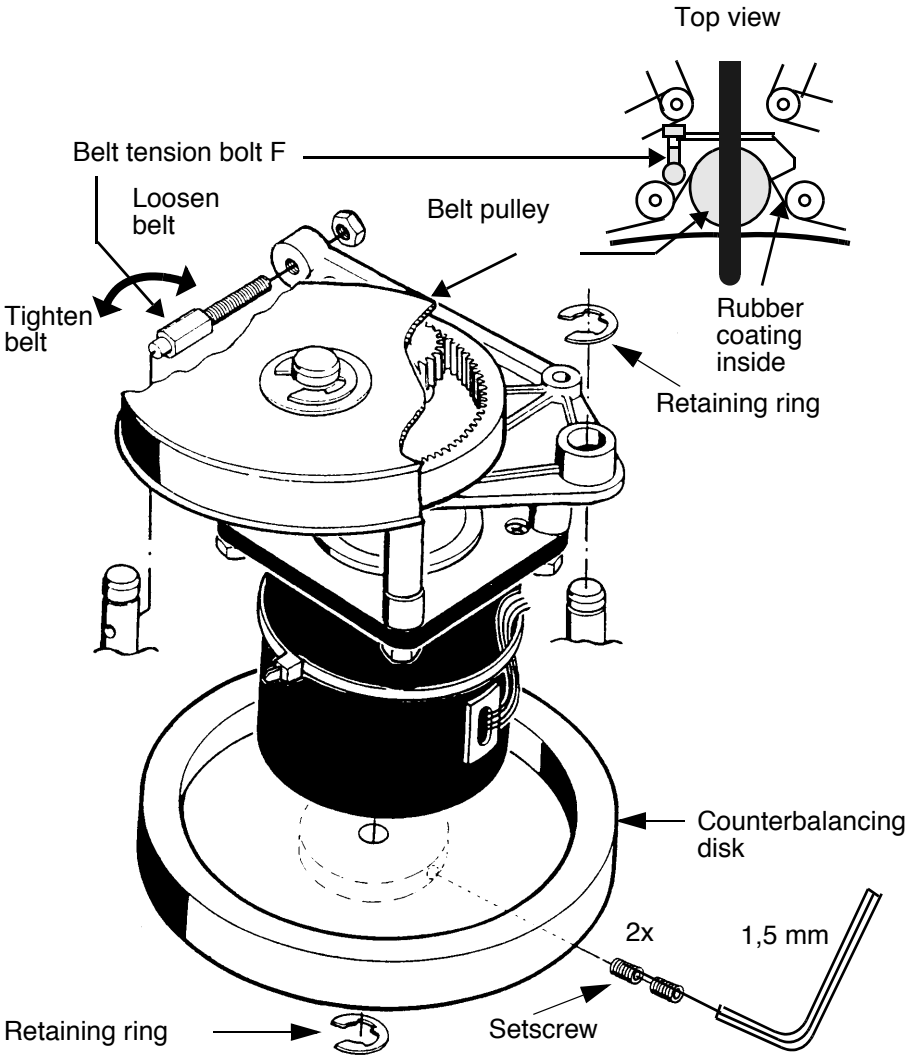


Fig.29: Tension of flat belt

7.16 Checking the flat belt on rotation motor M1

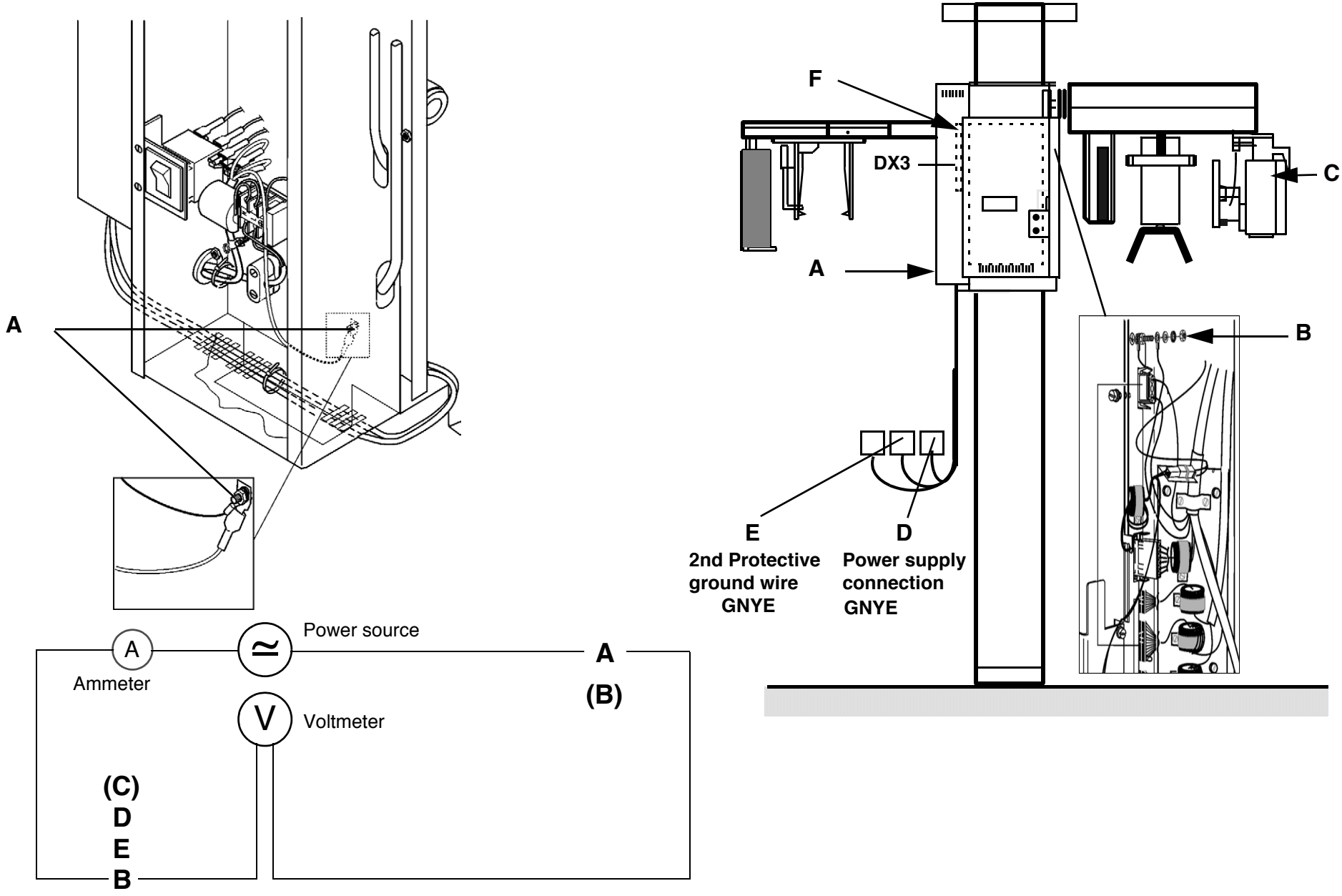


Fig.30: Measuring setup for protective ground wire test

ATTENTION

DANGER: Perilous shock hazard.
Switch power off.

– Switch power OFF at the main switch for the building installation.
– For pluggable units, remove the power plug from the electric outlet.
– Remove the power connection from the line terminal. Unclamp the second protective ground wire, if present.
– Remove the following cover parts:
  – Cover
  – Segment
  – Lateral cover plate
  – Front panel
  – X-ray tube assembly cover

Check whether the protective ground wire resistance (Table 1) complies with the specifications:

A power source of at least 0.2A with a no-load voltage of 24V max. and 4V min. is required.

– Apply an electric current between the parts specified in Table 1 for at least 5s.
– Measure the voltage drop with the voltmeter and the current with the ammeter. Then calculate the resistance using the formula **R = U / I**.

If the resistance exceeds the value specified in Table 1:

Check whether the protective ground wire is fastened according to specifications:

– Check whether the flat washer, toothed lock washer and cable lug are mounted on the protective ground wire in the right order and whether the nuts of the ground wire connections are tightened securely.

If the ground wire is not fastened according to specifications, fasten the ground wire properly.

Continued on next page

Table 1: Protective ground wire test between			
A and	**D**	**GNYE wire**	**0.1 Ω**
A and	**E**	**2nd protective ground wire**	**0.1 Ω**
A and	**B**	**Stud**	**0.2 Ω**
B and	**C**	**Tube assembly housing**	**0.2 Ω**
F Visual check			

Only ORTHOPHOS 3 DS / 3 Ceph with Upgrade Kit

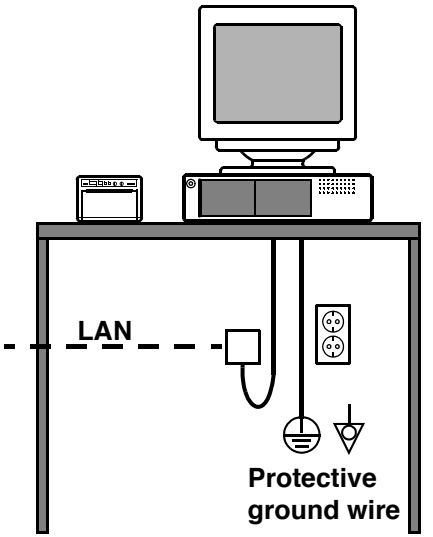


Fig.31: Protective ground wire test

7.17 Checking the protective ground wire and the unit's leakage current

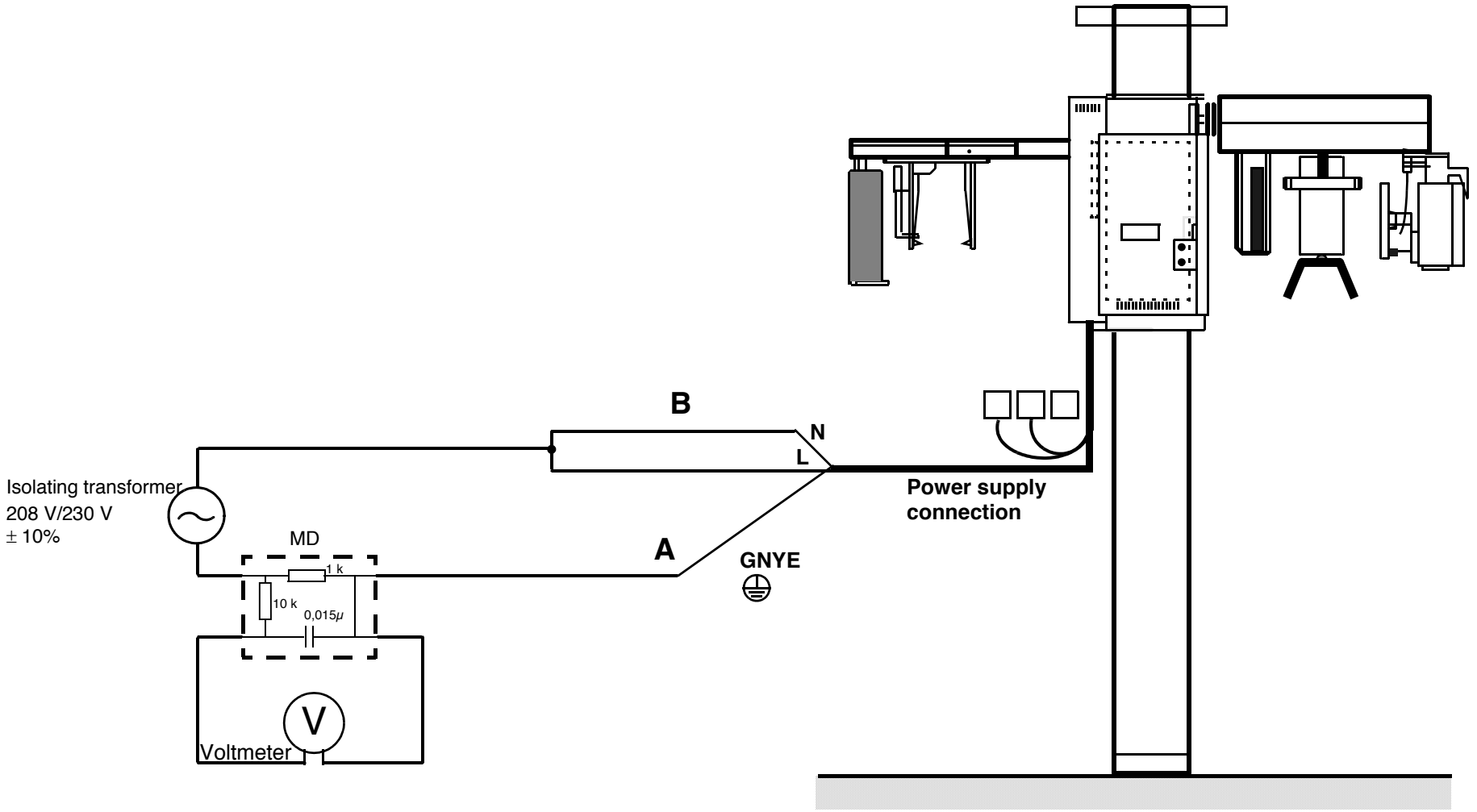


Fig.32: Measuring setup for testing the unit's leakage current

Continued from previous page

Check whether the unit's leakage current complies with the specifications:

ATTENTION
DANGER: Perilous shock hazard:
Do not touch the unit's housing while measuring the leakage current.

A high resistance measuring voltage source at line frequency (isolating transformer 208 V/ 230 V ± 10%) and a measuring circuit compliant with the requirements of IEC 601 are required.
Complete test units, e.g. the "Bender tester", fulfill these requirements.

– Check whether the unit power switch is turned on.
– Connect a high resistance measuring voltage source between the short-circuited power cable or plug B and ground wire A.
– Measure voltage drop across MD.

The numerical value of the measurement corresponds to the leakage current in µA, see adjacent table.

The measured value must not exceed **5 mA**.

– Enter measurement results in maintenance certificate for subsequent comparison measurements.
– Describe or enter the measuring instrument or measuring setup used in the adjacent field for reasons of reproducibility.

If the leakage current is not OK, measure the input interference suppression filter and check whether the leakage current is still too high.

If the leakage current is still too high, this may be due to one of several different reasons:

- Damaged cables
- Isolation fault in the motor
- Missing isolation plates
- Shields stuck or lying on top
- Plugs improperly fastened etc.

Measuring range		Leakage current
mV	=	µA
V	=	mA

Describe and enter measuring setup/measuring instrument:

Fig.33: Comparison table: Leakage current and measuring range

7.17 Checking the protective ground wire and the unit's leakage current

We reserve the right to make any alterations which may be due to technical improvements.

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